



Understanding Diabetes Mellitus

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General Information

History and Treatment of Diabetes

Diabetes mellitus has been a medical problem for over 2,000 years. One of the first symptoms identified with diabetes - frequent urination - was originally recorded in the oldest medical document, Ebers Papyrus, 1500 B.C. The next major breakthrough did not occur until 1922, when Canadians, Dr. Frederick Banting and Dr. Charles H. Best discovered insulin.

Blood sugar lowering pills (hypoglycemic agents) were introduced in the 1950s. Today these drugs are used to treat select individuals who have diabetes that cannot be controlled by diet - these individuals may not require insulin or cannot use insulin.

In the past 20 years, the scientific and technological advances in the field of diabetes have been remarkable. Human insulin has been successfully synthetically produced. Insulin therapy has become more individualized - making treatment specific to a person's age, lifestyle, and type of disease. Monitoring diabetes and glucose or blood sugar has become simpler and easier. Several new options for treatment are now available.

Glycosylated hemoglobin (HbA_{1c}) is a simple blood test that estimates blood glucose levels over three months. This type of test assists doctors and nurses in evaluating and treating the disease.

Select patients can now use insulin pumps to help control the serum blood glucose levels. Before this option was available, many patients would have to have three to four injections per day. The insulin pumps used today are portable and worn outside the body, usually attached by a belt or placed in a pocket. Whatever serum blood glucose control you use, management of your disease depends upon your knowledge and understanding of the disease, and how to balance your diet, insulin, and exercise for optimal health.

The long-term goal of insulin pump research is to develop an implantable device that monitors your blood sugar. However, this type of device is not yet available for widespread use.

There is also considerable pancreatic transplant research being conducted. Entire pancreas transplants and beta cell (insulin producing cells in the pancreas) have been tried. Unfortunately, this approach has not been too successful since the body tends to reject the transplanted tissue.



Prevalence of Diabetes

Diabetes is a common condition. There are approximately 16 million people in the United States with diabetes – and more than half of those people do not know they have the disease. As we live longer, the number of people with diabetes is estimated to grow at a rate of 600,000 per year.

Factors Leading to the Onset of Diabetes

Diabetes is not a disease that you can “catch” from someone. There are a number of factors that may be responsible for its development. Diseases that cause the destruction of the beta cells (insulin producing cells) of the pancreas may cause diabetes. Certain factors that may predispose you to diabetes include:

1. Genetic Factors

- A. **Family History:** People who have relatives with diabetes are more likely to develop diabetes. This is especially true with type 2 diabetes.

2. Environmental Factors

- A. **Obesity:** 60-90% of all people with diabetes mellitus are obese (overweight) at the time of diagnosis. Most people with diabetes find that their blood glucose (sugar) control improves with weight loss.
- B. **Age:** The majority of people with type 2 diabetes are over the age of 30 when they are first diagnosed. Therefore, as you grow older, the chance of getting diabetes increases. The incidence of type 2 diabetes in children and adolescents who are overweight and have a family history of type 2 diabetes is also increasing.
- C. **Viruses:** Some evidence indicates that viruses may play a role in the cause of type 1 diabetes in people who have diabetes in their families. A number of different viruses have been associated with the onset of diabetes, including: measles, mumps, hepatitis, mononucleosis, and pancreatitis.
- D. **Auto-Immune Disturbance:** With type 1 diabetes, an abnormality in the body's own immune mechanism may be responsible for damage to the insulin producing cells (beta cells) of the pancreas. This disturbance may be more commonly seen in a genetically susceptible individual.

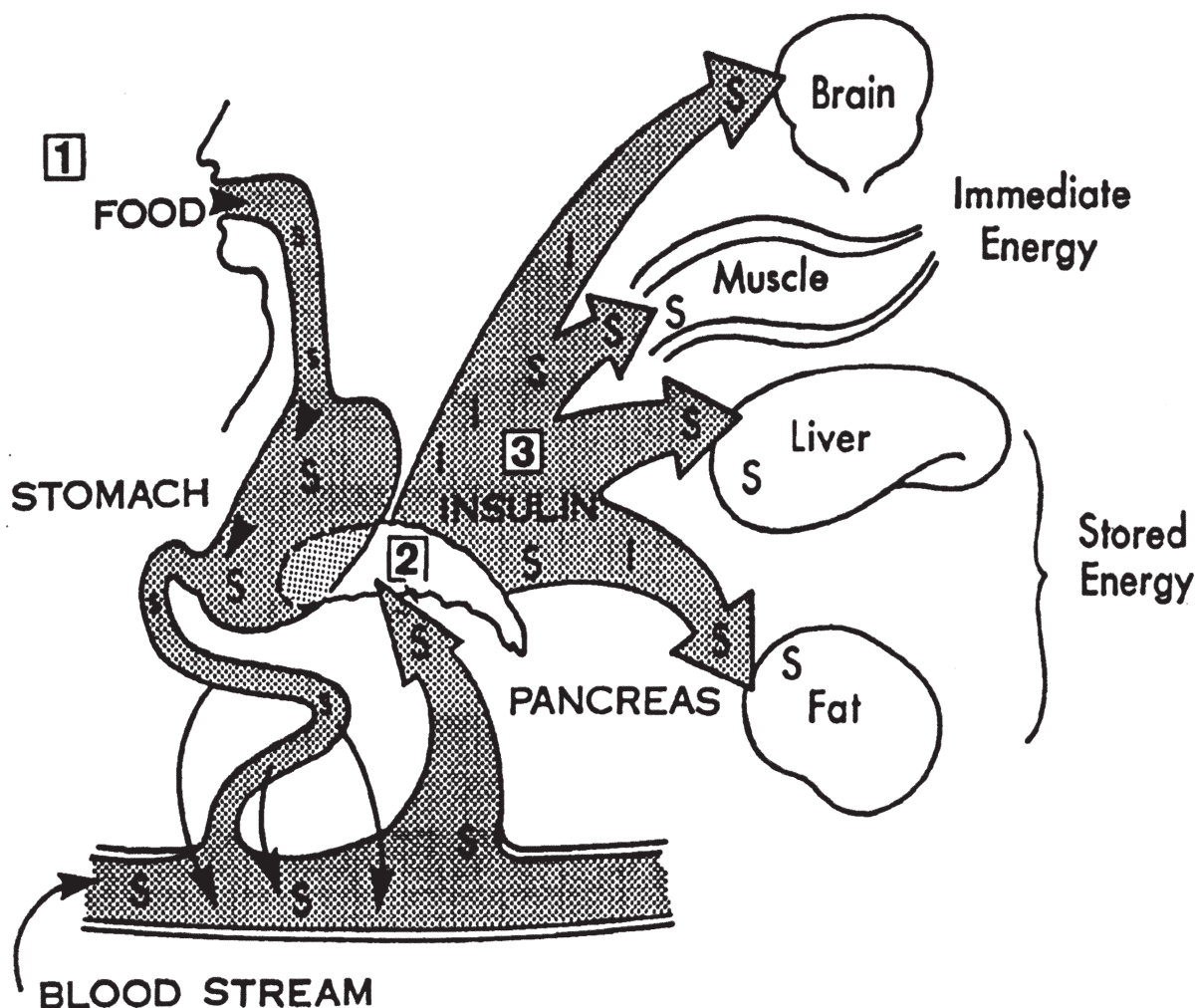
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What is Diabetes Mellitus?

Diabetes mellitus is an “energy crisis” in the body. The body does not properly use glucose (sugar) to produce energy. This is caused by the body’s inadequate use of, or lack of production of insulin by the body. Insulin, a hormone produced by specific cells in the pancreas, is necessary for our bodies to use sugar efficiently.

In order to understand what goes wrong in the body when someone develops diabetes, it helps to understand the normal digestive process.



Normal Digestion/No Diabetes

1. Food converted to sugar (glucose).
2. High blood sugar triggers the pancreas to release insulin.
3. Insulin carries sugar to body cells. (All cells need sugar to function normally.) The sugar shifts to body cells and blood sugar comes down.

Digestion and Diabetes

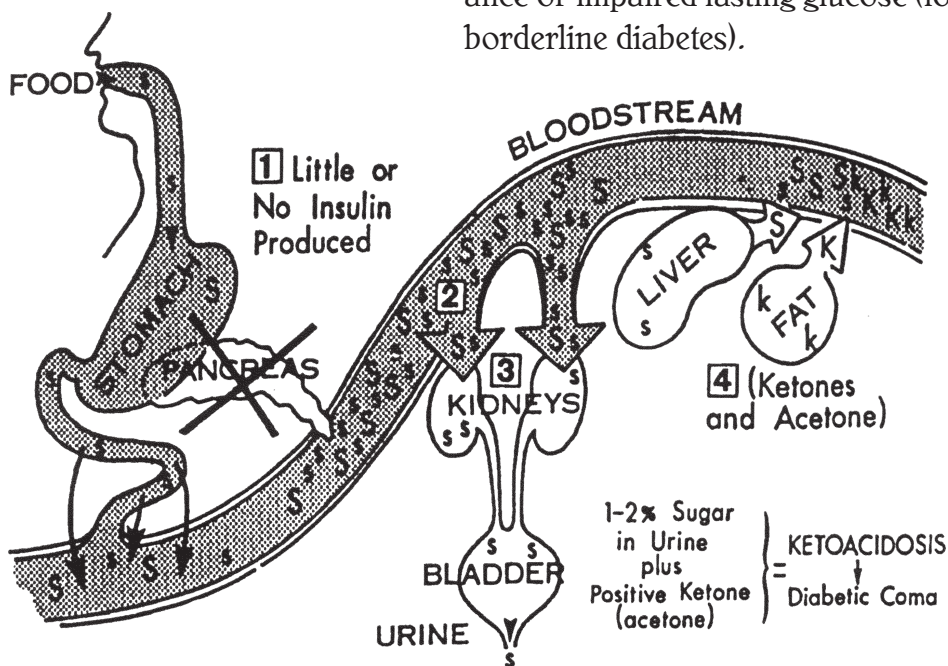
1. Basic Problem – diabetes occurs when the pancreas fails to produce enough insulin or the body cannot use insulin due to obesity and or insulin resistance.
2. As a result, sugar builds up in the blood stream and is not carried to the body's cells. That is why many people with diabetes feel weak and/or tired.
3. When blood sugar rises above normal (over 200 mg %), the excess sugar is lost in the urine. This may result in symptoms of thirst and frequent urination.
4. Sugar is released from the liver and accumulated in the blood. Ketones are released from fat breakdown. Accumulation of these products in the blood can lead to **KETOACIDOSIS** and/or **DIABETIC COMA**.

When diabetes occurs, the pancreas loses its efficiency. It is no longer able to produce enough insulin to handle the amount of sugar present in the blood. Many people with type 2 diabetes produce enough insulin but their body tissue is not as sensitive to the insulin. This is called insulin resistance.

People with abnormally high blood sugar (hyperglycemia) may exhibit:

- A. Tiredness or weakness
- B. Hunger
- C. Sudden weight loss
- D. Excessive thirst and frequent urination
- E. Visual disturbances (blurred or double vision)
- F. Itching skin or slow healing of infections
- G. Ketoacidosis or diabetic coma

It is important to realize that some people never develop symptoms. This type of person is known as someone with impaired glucose tolerance or impaired fasting glucose (formerly called borderline diabetes).



Diagnosis of Diabetes

Physicians may suspect diabetes in people with a family history of the disease and/or someone who is overweight. Oftentimes, a patient's symptoms indicate a need to test for diabetes. The kinds of tests most frequently used to diagnose diabetes include:

1. **Urine Sugar Tests** – if sugar is found in the urine, it is likely the patient has diabetes.
 - a. Urinalysis
 - b. Ketodiastix
 - c. Testape
 - d. Diastix
 - e. Clinitest
2. **Blood Tests** – this is a more accurate way to test for sugar. Several different blood tests may be done, including:
 - a. **Fasting Plasma Glucose** (fasting blood sugar) – this is done by taking a blood sample in the morning, prior to eating breakfast or taking diabetes medications. The normal level is usually 60-110 mg/dl but this may vary due to a number of factors. You should discuss your normal value with your physician. Fasting plasma glucose levels greater than 126 mg/dl on two different days is a diagnosis of diabetes mellitus.
 - b. **Blood Sugar Two Hours After a Meal (2 hr. pp)** – this test requires taking a blood sample two hours after eating, when the plasma glucose level should be less than 140 mg/dl. If there is an impaired glucose tolerance, the plasma glucose level will be 140 or more but less than 200 mg/dl.
 - c. **Oral Glucose Tolerance Test (O.G.T.T.)** – is only used occasionally to test diabetes. It usually begins with a fasting plasma glucose test followed by the consumption of a sweet glucose drink (Glucola). After drinking the sweet glucose, the plasma glucose is drawn at regular time intervals to determine how effective your pancreas is, how well it handled the glucose load, and how quickly your blood sugar returns to a normal level. This test should be performed carefully, according to conditions outlined by your doctor.
 - d. **Glycosylated Hemoglobin (HbA₁C)** – this blood test is not influenced by food. It measures the amount of sugar that attaches to protein in the red blood cells over three months. The greater the amount of sugar in your blood overall, the higher your HbA₁C results. The American Diabetes Association recommends that most people with diabetes keep their HbA₁C less than 7%, to prevent long term complications that could include: damage to the eyes, kidneys and feet. You should have this test when you are first diagnosed with diabetes and two to four times per year thereafter.

Refer to the table below to compare your HbA₁C to average blood sugars. Even if you test your blood sugar levels every day, there could still be times when your blood sugar levels are high. The HbA₁C test will let you know if this is happening so you can make the appropriate changes in your treatment with your doctor. The test could also tell you that your blood sugar levels are near normal - which is good news to hear!

Hemoglobin A₁C (HbA₁C) and Average Blood Glucose Readings

HbA ₁ C	Average Blood Glucose over 2-3 months
5.0	90
5.5	105
6.0	120
6.5	135
7.0	150
7.5	165
8.0	180
8.5	195
9.0	210
9.5	225
10.0	240
10.5	255
11.0	270
11.5	285
12.0	300
12.5	315
13.0	330

Blood Sugar Control for People with Diabetes

	HbA ₁ C	Level of Control
Non-diabetic range	4-6%	Very Good
Recommended range	Under 7%	Good
Recommended range	7-8%	Fair
Take action range	Above 8%	Poor

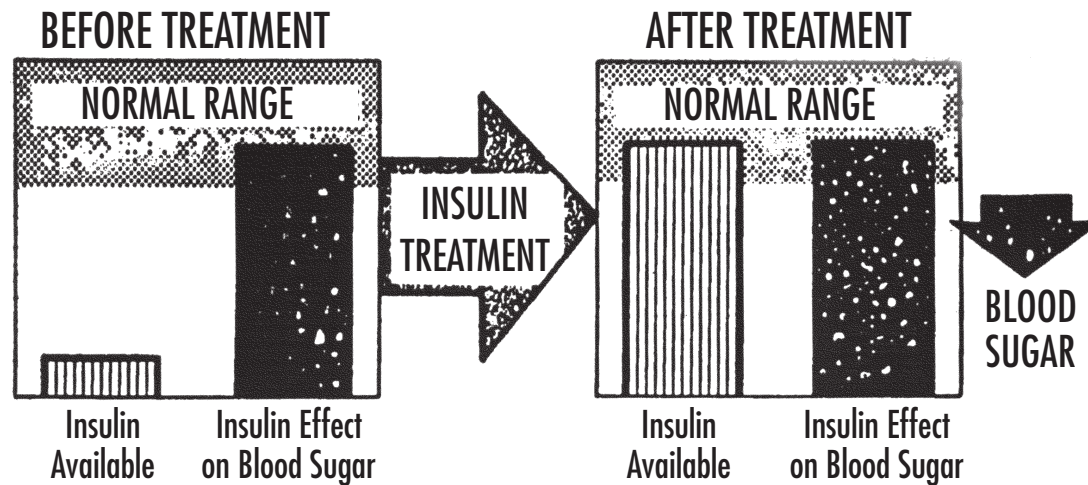


Types of Diabetes Mellitus

In 1997, new classifications of diabetes were established:

Type 1

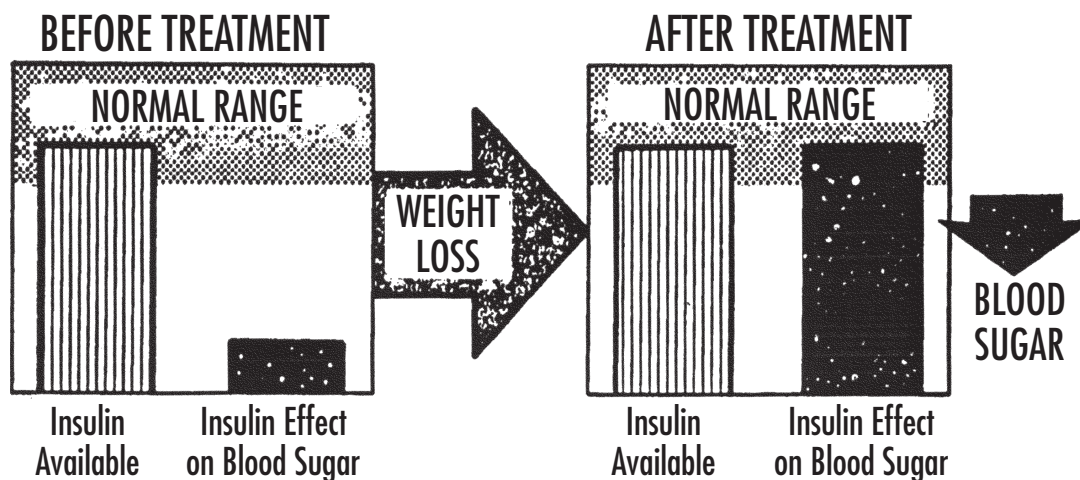
Beta cells in the pancreas are destroyed, leading to a lack of insulin. Often called insulin dependent diabetes. At time of onset, ketones may be in blood or urine. Must be treated with insulin.



Type 2

Adequate amounts of insulin may be produced but it is not effective in lowering the blood sugar. There may be insulin resistance. Often called non-insulin dependent diabetes.

Treatment could include: diet, exercise, pills, and/or insulin.



Gestational Diabetes Mellitus

Carbohydrate intolerance first recognized during pregnancy. Treatment is diet and/or insulin.

Methods of Treatment

There is no cure for diabetes. However, people with diabetes can live normal, healthy lives. The goals of diabetes treatment include:

1. Prevention of acute symptoms of high and low blood sugar.
2. Maintenance of a normal blood sugar level most of the time.
3. Delay or prevent some of the chronic complications of the disease, affecting the eyes, kidneys, and feet.
4. Infrequent hospitalization.
5. Decrease absenteeism from work/school.
6. Normal growth and development — physically and psychologically.

Diabetes can be treated by:

1. **Diet Management** - This is the cornerstone of treatment. By controlling the amount of food (and sugar), blood sugar levels can be maintained at or near normal levels. Patients who do not have symptoms, or have mild symptoms will probably be started on diet alone. Oftentimes when a person is overweight or obese, weight loss combined with a regular meal plan is all that is needed for control of type 2 diabetes.
2. **Diet Management Plus Oral Antidiabetic Agents (pills)** - Many people with diabetes cannot produce enough insulin or have a resistance to insulin. If you cannot produce enough insulin when following a diabetic diet alone, oral agents may be added to your treatment plan. These agents are not insulin. They are designed to help the pancreas produce more insulin or help your body's insulin work better. Diet and oral agents may help lower blood sugar. These drugs should be used with caution and only under certain circumstances. Your doctor will advise you.
3. **Diet Management and Insulin** - Some people's pancreas does not produce enough insulin and therefore cannot benefit from the oral agents. These types of patients must take insulin by injection. Insulin must be injected. If taken by mouth, the protein is broken down and destroyed by the stomach's digestive juices. This would make the insulin ineffective in lowering the blood sugar.

There is no cure for diabetes. However, people with diabetes can live normal, healthy lives.



Coping with the Diagnosis of Diabetes

When you first learn you have diabetes, it is natural to be scared. Don't ignore the fact that you have diabetes or say that you have a "touch of sugar." If you deny that you have diabetes, you are denying yourself the need for treatment.

We realize it is not easy to come to terms with the fact that you have an incurable, chronic illness. Although diabetes is not curable, it can be controlled and you can live a normal, healthy, productive life.

Principles of Diabetes Management

Dietary Aspects of Diabetes - the Basics of Good Nutrition

The most important tool for successful diabetes management is meal planning. When taking care of your diabetes, your diet is crucial. Many people who are overweight find that they are able to control their diabetes with diet alone. For others, diet may be combined with oral hypoglycemic agents or insulin injections. Meal planning can help keep your blood glucose, cholesterol, triglycerides, and blood pressure in your target range. It can also help reduce your risk for heart attack and stroke.

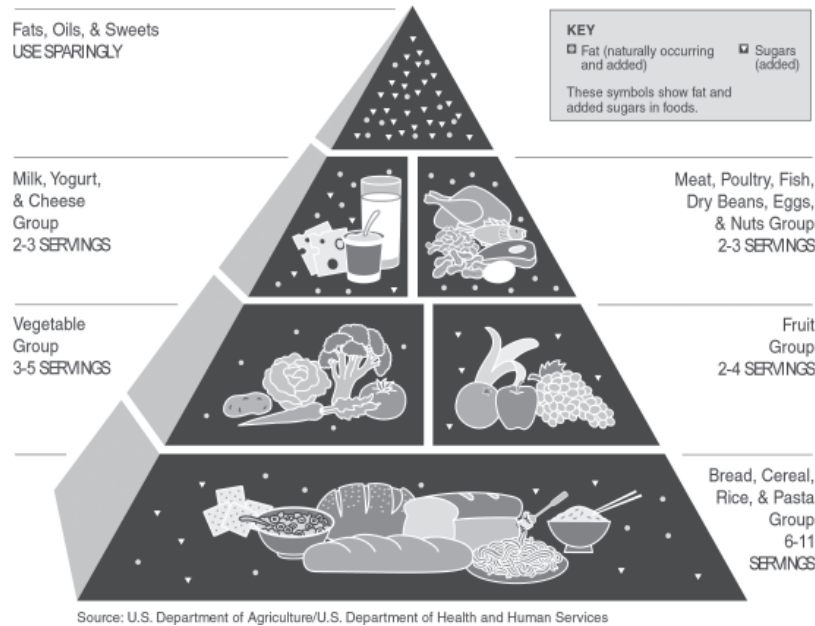
Everyone needs a nutritious diet to maintain a healthy body. Good nutrition is the key to good health. The diabetic meal plan is composed of three well-balanced meals, spaced evenly throughout the day. This diet provides a variety of wholesome foods to supply the body with the energy and nutrients it needs. Use the Food Guide Pyramid (on the next page) to help you get started.

It is important to eat servings from all of the food groups so you get the vitamins and minerals your body needs. You need more of the foods found at the bottom of the pyramid and less of those foods found at the top. Remember, the closer a food is to its natural state, the better it will be for you. The more a food has been processed or altered from its original state, the less it will benefit you.



Food Guide Pyramid

A Guide to Daily Food Choices



A meal plan will be developed to fit your particular lifestyle. Your age, sex, weight, exercise habits, and medications are all considered when a meal plan is created for you.

What is a calorie?

A calorie is a unit used to measure the heat or energy value of food. Almost every food contains some calories. Calories come from carbohydrates, proteins, fats and alcohol. Protein and carbohydrates have approximately four calories per gram. One gram of fat has nine calories. Alcohol, which is not a nutrient, (meaning it is not essential for life), has seven calories per gram. One gram is about 1/30th of an ounce.

A diabetic diet gets 50-60% of the day's calories from carbohydrates. Twenty percent come from protein. About 20-30% come from fat. Your calorie level will depend on a number of factors including: your age, sex, height, weight, occupation, and leisure activities. For example, a young person of ideal weight who works in a factory and plays baseball after work requires more calories than a person who spends most of his/her time sitting at a desk all day.



Nutrients

There are approximately 50 nutrients needed for good health. Those nutrients belong to one of the following groups:

- Protein
- Fat
- Carbohydrate
- Vitamins
- Minerals
- Water

These nutrients work together to supply you with energy (calories) that help build and maintain body cells that regulate body processes.

Protein

Protein is necessary for growth. The body uses protein to build, maintain and repair cells and tissues. If too few carbohydrates or fat calories are eaten, it is also used for energy. Protein is made up of building blocks called amino acids. There are 22 amino acids. There are nine essential amino acids that the body cannot make – and therefore must receive from food.

Proteins containing the essential amino acids include: meats, poultry, fish, eggs, milk, and cheese. Foods like dried peas, beans, nuts, grains, cereals, and seeds contain some protein but lack one or more of the essential amino acids. These are known as incomplete proteins.

Fat

Fat carries (fat soluble) vitamins throughout the body. Fat deposits help support and cushion organs, as well as provide the body with insulation. We need to include some fat in our diet to provide our body with the essential fatty acids it cannot make.

Fat sources include: butter, margarine, poultry skin, and salad dressings. However, some fats can increase the risk of heart disease. These are known as cholesterol and triglycerides. Specifically, saturated fats included in the “marbling” on meats, poultry skin, lard, cream, butter, coconut oil, palm oil shortening, and cocoa butter can raise your cholesterol level.

Most of your fat choices should come from polyunsaturated fats that can be found in corn, sunflower, safflower, sesame, or cottonseed oils. Monounsaturated fats from avocados, olive or peanut oil, nuts and seeds are also good for you and will not raise your cholesterol level.

Do not exceed the fats allowed in your prescription diet. A high fat diet can raise your blood fat (triglyceride).



Carbohydrates

A carbohydrate is the scientific name for sugar and starch. It is a major source of energy for your body. If you consume too little carbohydrates and fat, the body is forced to use the protein you eat to get its energy. The body needs an adequate amount of carbohydrates so that protein is not its only source of energy.

There are two types of carbohydrates:

- **Simple carbohydrates** are easily digested (broken down) and enter the blood stream quickly. People with diabetes eat simple carbohydrates when their blood sugar is too low.

The amount of simple carbohydrates or sugars allowed in the diabetic meal plan is restricted.

Foods that are high in simple carbohydrates:

- Cakes/pies/cookies
- Candy
- Chewing gum
- Condensed milk
- Corn/maple syrup
- Gelatin dessert
- Honey
- Jam/jelly/marmalade
- Kool-aid/punch drinks
- Molasses
- Regular carbonated beverages
- Table sugar



■ **Complex Carbohydrates**

Most of the carbohydrates found in a diabetic meal plan should come from starchy foods that contain complex carbohydrates. Complex carbohydrates can be found in:

- Bread/rolls
- Cereal
- Crackers
- Noodles/macaroni
- Potatoes and other starchy vegetables
- Rice

Fiber

Some complex carbohydrates contain fiber. However, the body cannot readily digest fiber. Recent studies show that a diet rich in fiber may help lower blood sugar and some blood fats (cholesterol). Fiber adds “bulk” to your diet. This helps you feel full. Fiber helps many people lose weight by making you feel full, therefore cutting down on the amount of food you eat. Consuming a diet high in fiber can also help prevent constipation.

Fiber can be found in complex carbohydrates like fresh vegetables and fruits, whole grain breads and cereals, dried beans, peas, and nuts.

The body turns all foods containing protein, fat, or carbohydrates into a sugar called glucose. This is used as a source of energy or calories. This is the reason that almost all foods must be accounted for as a source of calories in the diabetic meal plan.

Vitamins and Minerals

Vitamins and minerals are needed to maintain good health. The body uses them for vision, strong bones and teeth, and healthy skin. Vitamins and minerals can be found in almost every food. Eating a well-balanced daily diet ensures that your body receives the necessary amounts of these nutrients.

Water

Water is another nutrient needed by your body. About 3 1/2 quarts of water should be consumed each day. This amount will replace the

water the body loses through regular perspiration and the elimination of other body waste. Some of the water we consume comes from the breakdown of the solid foods we eat. Approximately, 1 1/2 quarts of water should be consumed by drinking beverages.

Obesity and Weight Control

In order to control your diabetes, it is very important to keep your weight within an ideal weight range.

You, your physician, and your dietitian should determine your ideal weight. Typically, your ideal weight is the weight at which you function and feel best.

Eighty percent of adults diagnosed with diabetes are overweight. Moderately obese people are five times more likely to develop diabetes. People who are more than 20% over their ideal weight are considered obese.

As you get older, your body weight tends to increase. The more obese someone is and the longer he/she remains obese, the greater the danger to his/her health. In addition to diabetes, other serious health problems may result from obesity, including:

- back/hip/knee pain
- gallbladder disease
- gastrointestinal upsets
- heart disease
- high blood pressure
- lethargy
- varicose veins



Obesity places a greater demand on the pancreas, increasing the need for insulin. It takes many years for obese people to develop diabetes. During this time, extra insulin is produced. Eventually, the cells that produce insulin become tired from the additional work. They are no longer able to produce as much insulin. When you are overweight, the body seems to resist insulin, so it does not work as well as it should. Frequently, when a person with type 2 diabetes loses weight, he/she finds that he/she no longer needs diabetic medication or insulin. After weight loss, the pancreas works better and can control blood sugar levels more effectively.

Weight control is a matter of energy balance. You need to balance your food intake with your energy output each day.

For example:

Food Intake (calories)	Energy Output (calories)	Body Weight
1800	1800	Maintained
2000	1800	Increases
1600	1800	Decreases

When you accumulate 3,500 calories more than you use, you gain one pound. If you use (burn) 3,500 calories more than you eat, you will lose one pound.

Weight loss should be accomplished gradually. Loss of one to two pounds per week is ideal. Crash diets should be avoided. They do not help establish the kind of eating habits that are necessary for maintaining ideal weight. Any weight lost is usually gained back quickly once a crash diet has stopped.

A weight loss of eight to ten percent of the current body weight may be all that is needed to improve glucose control. The diabetic meal plan provides a well-balanced, nutritious diet that can help you to reach your ideal weight and create healthy eating patterns that will last a lifetime.

If you want to lose weight, you must eat fewer calories than your body needs. To lose one pound of stored fat, you need to reduce your food intake by 3,500 calories for each pound of fat you want to lose. To make up for the decrease in calories (food intake), the body will burn stored fat for energy and weight will be lost.



There is no magic formula or combination of foods that cause weight loss. It is a matter of burning more calories than what is eaten. By combining regular exercise with the diabetic meal plan (specific calorie level calculated for weight reduction) you will be able to reach a healthy weight. A weight-loss diet should be well-balanced and consist of three meals and one snack following your regular meal schedule. The basic difference between a diabetic meal plan used to maintain a person's weight and one used to cause weight loss is not in the types of food eaten but the amount. See the meal planning section for more detailed information.

If you have a question about your weight or need a weight reduction diet, please ask your doctor and/or dietitian.

Meal Planning

A meal plan is a schedule of how much to eat at each meal. If you have diabetes you should:

■ Eat three meals and a bedtime snack at regular times each day.

Eating three meals a day is important for good nutrition, as well as good diabetes control. By eating meals equally spaced (four to five hours apart) throughout the day, an even workload is placed upon the body to digest the food. In an individual with diabetes whose pancreas is still producing small amounts of insulin, equally spaced meals can prevent added strain on the body. People with diabetes who take insulin injections or oral hypoglycemic medications, must eat evenly spaced meals to ensure there is enough glucose in the blood-stream to prevent an insulin reaction.

■ Pay attention to portion sizes.

Diabetics should have measuring cups for one cup, 1/2 cup, 1/3 cup and 1/4 cup. You should also have measuring spoons for one tablespoon, one teaspoon, 1/2 teaspoon, 1/4 teaspoon, and 1/8 teaspoon. A diet or postage-type scale is also suggested for weighing meat portions.

You do not need to measure everything you eat but you should measure your food until you can accurately estimate the proper portion sizes.

■ Do not save food from one meal and add it to another.

This approach to eating defeats the purpose of evenly divided meals.

Planning Your Meal Plan

Once you have been prescribed a specific calorie level, your dietitian will give you tools to help you plan your food intake. These tools include a list of foods you may eat called an "exchange list" and a sheet outlining your meals into three meals and one snack.

You will probably still be able to eat many of your favorite foods. However, if a specific food is not mentioned, ask your dietitian if it is allowed on your diet. If possible, bring a label or box listing the ingredients and nutritional information for your dietitian to review. This will help him/her calculate that food into your meal plan. As always, you should avoid foods you may be allergic to.

Exchange Lists

Exchange lists can be found in the 1995 edition of a booklet entitled “Exchange Lists for Meal Planning.” This booklet contains basic information about the types and amounts of food allowed on your diet. There is also a shorter version of this available from 1997, entitled “The First Step in Diabetes Meal Planning.” Foods that are similar in protein, fat and carbohydrate content have been grouped together. It isn’t necessary to memorize the calorie content of the foods you eat because foods contained on each list have the same caloric value. Each food on the list can be exchanged or traded for one another. You can only trade or exchange foods that are on the same list. As you read the exchange lists, you will notice that the portion size for one food may be larger than another food from the same list. Because foods are so different, each food is measured or weighed so the amount of carbohydrate, protein, fat and calories are the same in each list.

Summary of the Exchange Lists

■ Starch/Bread List

This list contains bread and grain products such as cereal, rice, noodles, spaghetti and muffins. Some vegetables such as corn, potatoes, and peas are included in this list because they are higher in carbohydrates and are referred to as starchy vegetables. One serving from the starch/bread group is equal to one carbohydrate choice or 15 grams of carbohydrate.

■ Meat List

This list is divided into groups: very lean, lean, medium fat, and high fat meat exchanges. In order to reduce your intake of saturated fat, try to choose more of your meat selections from the lean or medium fat meat groups. This group does not contain carbohydrates. It predominately contains protein and fat.

■ Vegetable List

This list contains vegetables that are relatively low in carbohydrates and calories. Vegetables are good sources of vitamins and fiber. One serving from the vegetable group provides five grams of carbohydrates.

■ Fruit List

This list consists of fruits and juices. All of the fruits or juices you consume should be unsweetened. “Unsweetened” means that no sugar has been added to the product. The only sugar that is present is sugar that has occurred naturally. You may buy fresh fruit, fruit canned in water, fruit canned in its own juice, or frozen fruit without sugar. Read labels of fruit juices to be sure no sugar has been added. In general, fruit drinks, fruit punches, and fruit-aids contain sugar. One fruit serving contains 15 grams of carbohydrates.



■ Milk List

The milk list contains homogenized whole milk, low fat milk, skim milk, non-fat dry milk, evaporated milk, and buttermilk. Wherever you see “one milk exchange” listed on your meal plan, you may choose one serving of the type of milk you are allowed on your diet. The kind of milk you can have depends upon the number of calories you are allowed. In general, try to stick with low fat milk choices to reduce your intake of saturated fat. One milk choice provides 12 grams of carbohydrates but can be exchanged as 15 grams of carbohydrates on the meal plan, or one carbohydrate choice.

■ Fat List

Foods that contain fat are on this list. Examples of these foods include: butter, margarine, salad oil, bacon, nuts, and salad dressings. Vegetable fats (corn oil, margarine, safflower oil, salad dressings made with soybean oil) are preferable to animal fats (butter, lard, bacon, salt, pork) that tend to raise blood cholesterol levels. The major nutrient in this food group is fat. There is no protein or carbohydrate.

■ Free Foods

There are some foods that are so low in calories, you can eat them at any time, as long as your diet permits.

Free Foods

(less than 20 calories per serving/less than five grams of carbohydrates)

- Bouillon without fat * *
- Ketchup (1 Tbsp)
- Coffee/tea
- Diet, calorie-free drinks
- Diet syrup (2 Tbsp)
- Hot sauces
- Lemon
- Lime
- Low sugar jam/jelly (2 tsp)
- Mustard
- Non-stick pan sprays
- Soy sauce * *
- Spices/herbs
- Sugar-free gum
- Sugar substitutes
- Unsweetened gelatin
- Unsweetened pickles * *
- Vinegar
- Wine (1/4 cup used in cooking)
- Worcestershire sauce

* *These items are high in salt

Diabetic meal planning should meet the dietary guidelines for Americans which includes:

“Eating a variety of foods, maintaining a healthy weight, a diet low in fat, saturated fat and cholesterol, reduced in salt and sodium, use of sugar in moderation, increased use of fruits, vegetables and grain products, increased fiber, and alcohol in moderation.”

Sweeteners

There are two types of artificial sweeteners - non-caloric sweeteners and caloric sweeteners. The use of these sweeteners should be discussed with your doctor and dietitian.

Saccharin is a non-caloric sweetener. It can be found in the supermarket in granular, tablets and liquid form. It is about 300 times sweeter than table sugar (sucrose) and is often used to sweeten coffee, tea, or cereal. Saccharin will not raise your blood sugar level. Since it is calorie-free, saccharin may be used with a weight reduction diet. Be aware that many saccharin products contain sodium and should be used in limited amounts if you are on a sodium restricted diet.

Fructose and sugar alcohols (sorbitol, mannitol, and xylitol) are caloric sweeteners. The body uses these sugars differently than any other type of sugar. If you have well-controlled diabetes, these sugars will not cause a rapid rise in blood sugar levels. However, these types of sugars contain calories and therefore should be avoided if you are on a weight reduction diet. Foods containing caloric sweeteners are not free foods.

The use of these sweeteners should be discussed with your doctor and dietitian.

The brand name Nutra-Sweet (generically known as aspartame) is the most popular sugar substitute. Nutra-Sweet is about 180-200 times sweeter than table sugar and is considered to be non-caloric. It will not cause a rise in your blood sugar and may be used on a weight reduction diet. Nutra-Sweet is available as a tabletop sweetener (known as the brand name Equal). It can also be found in instant tea, fruit-flavored mixes, and diet prepared gelatin desserts.

Sucratose (Splenda) is also a non-caloric sweetener. 600 times as sweet as table sugar. It will not cause a rise in your blood sugar and may be used on a weight reduction diet.

Other Sugar Substitutes, Alternatives or Replacements

- Sweet-10 (Saccharin)
- Diabeta Choice
- Sugar Twin (Saccharin)
- Sweet 'n Low (Saccharin)
- Sprinkle Sweet (Saccharin)
- Sweet One (Acesulfame K)



Dietetic Foods

People with diabetes should not use many of the foods on supermarket shelves that are labeled “dietetic.” Dietetic foods are prepared for persons following *various* modifications in diet, not just diabetes. Examples of dietetic foods are:

- Foods that have left the regular sugar out or have been replaced with a substitute. (Look for sugar-free or no added sugar on the label.)
- Foods with a reduced *sugar* content may contain up to **50%** of the original sugar content. (Look for sugarless on the label.)
- Foods that have the salt left out.
- Foods using a different kind or amount of fat than usually used.
- Foods that leave out an ingredient to which an allergy may exist.

Dietetic foods are not always low in sugar or calories and therefore, may not be appropriate for your diet. Be careful when shopping. Look for “hidden” forms of sugar and calories that may appear on ingredient labels. Avoid foods that list any of the following as one of the first three ingredients:

- bittersweet chocolate
- brown sugar
- confectioner’s sugar
- corn sugar
- corn sweetener
- corn syrup



- dextrose
- glucose
- granulated sugar
- honey
- invert sugar
- maltose
- maple syrup
- milk chocolate
- molasses
- sucrose
- sweetened condensed milk

It is not necessary to use dietetic foods. If you are unsure of a product, it is best not to use it. In general, avoid dietetic cookies, cakes, candy and ice cream.

Use of Alcohol

Many people with diabetes ask about the use of alcoholic beverages. His/her use will affect each individual with diabetes differently. However, if a person with diabetes is eating and drinking alcohol at the same time, the blood sugar level will increase. If, a person with diabetes is not eating but is drinking *alcohol*, it may decrease the blood sugar and cause an *insulin reaction* or other serious side effects. For this reason, alcohol should be consumed with extreme caution, especially when taking insulin or oral hypoglycemic medications. *Be aware* that alcohol contains little or no nutritional value, although it is a source of calories, providing 7 calories per gram. You must add these calories into your allowed calories for the day. The use of alcohol in your diet should be discussed with your doctor and dietitian. For a brief listing of alcoholic beverages, measures, calories and exchanges, refer to the table below.

For both insulin dependent and non-insulin dependent diabetes, no more than two alcoholic beverages once or twice a week, with a meal, is all that is recommended.

Type of alcohol, measures, calories and exchanges

	MEASURES	CALORIES	EXCHANGES
LIQUOR/LIQUEUR			
Whiskey, Rye, Scotch, Bourbon	1 oz.	75-85	2.5 fat
Brandy, Gin, Rum	1 oz.	75-90	2.5 fat
Liqueurs & Cordials	2-3 oz.	50-80	.5 fat, .5 bread
BEER/ALE			
Malt Liquor, Ale, Beer, Stout	8.5 oz.	150	2 fat, 1 bread
Light beer	8.5 oz.	97	2 fat
Near beer	8.5 oz.	65	1.5 fat
WINES			
Sweet, Domestic	3.5 oz.	140-165	2 fat, 1 bread
Sweet, Imported	3.5 oz.	110-175	2 fat, 1 bread
Dry, Domestic	3.5 oz.	75-90	1.5 fat
Dry, Imported	3.5 oz.	60-100	1.5 fat
CIDER			
Sweet	8 oz.	100	1 bread
Hard (Fermented)	3.5 oz.	40	1 fat



Dining Out – Restaurants

Once you have learned how much of what you can eat, dining out can be easy. It is possible to have a nice meal in a restaurant and still follow your diet. Pay attention to the dining out guidelines listed below. This material has been adapted from a book entitled: Family Cookbook, published by the American Diabetes Association and the American Dietetic Association.

Guidelines for Dining Out:

- Become familiar with your individual meal plan.
- Familiarize yourself with the foods and portions on each exchange list.
- Become familiar with serving sizes by practicing at home. Faithful measuring will teach you to recognize portions.
- If portion sizes are too large, ask for a doggie bag and save the leftovers for the next day.
- Don't hesitate to ask how a food is prepared. You may ask to have the salad dressing or gravy served on the side or ask if they serve plain vegetables instead of creamed ones.
- If you are insulin-dependent, you must eat on schedule. If you think there will be a wait for a table or the service will be slow, you may want to eat part of your usual meal before going to the restaurant.
- Although what and how much you eat depends on your meal plan, foods that are generally suitable and those that should be avoided are listed on the next page.



Foods to Order:

Appetizers

Tomato juice, unsweetened fruit juice, clear broth, bouillon, consommé, celery, radishes, dill pickles, fresh or unsweetened fruit. If you are sodium restricted, avoid broth that is not homemade as well as bouillon and dill pickles.

Meat, Fish, Poultry

Roasted, baked or broiled meat, poultry, fish or seafood. Broiled foods may be available on request but expect a 20-minute wait for them. Ask that gravy be served on the side or used sparingly. Trim excess fat from meats. If a food arrives unexpectedly breaded, peel off the outer coating. If the serving exceeds the meal plan portion, ask for a doggie bag.

Eggs

Poached, boiled, scrambled.

Potatoes and Substitutes

A mashed, baked, boiled, steamed potato, rice, and noodles.

Fats

Margarine, light or diet salad dressings, bacon, sour cream. (Remember to count the fat used on vegetables in the kitchen. Count it as 1 fat exchange.)

Salads

Tossed vegetable, lettuce, sliced tomatoes. Request that the dressing be served separately so you can control the amount you use or choose a lemon wedge or vinegar. Cottage cheese is part of the meat allowance.

Breads

Plain whole wheat or enriched bread or toast, rolls, biscuits (1 small biscuit = 1 bread exchange), crackers, bread dressing (1/3 cup = 1 bread and 1 fat exchange).

Other Substitutes for 1 Starch/Bread Exchange

- 2 Bread sticks (9" long)
- 4 Melba toast rectangles or 8 rounds
- 3 Rye Crisps
- 1/2 Bagel
- 1/2 Hot dog bun (If small - 1, about 1 oz.)
- 1/2 Hamburger bun (most full-size buns = 2 exchanges)
- 1 Tortilla or taco shell
- 1/2 English muffin



Vegetables

Stewed, steamed, boiled. (If vegetables are not listed on the menu, ask if any are available.)

Desserts

Fortunately, desserts are usually priced separately. You might ask for: fresh fruit or fruit juice, ice cream (occasional use only) (1/2 cup scoop = 1 starch/bread and 2 fat exchanges) or plan to have an apple on the way home.

Beverages

Coffee, tea and milk (according to the meal plan), diet soft drink if available.

Foods to Avoid

Appetizers

Cream soups, thick soups, sweetened juices, canned fruit cocktail, seafood cocktail (must be counted as part of or all of meat allowance, depending on size of appetizer).

Meat, Fish, Poultry

Fatty, fried and breaded foods, meats in cream sauce, barbecued meat, stews and casserole-type dishes (these are better eaten at home so you know what is in them).

Eggs

Fried, creamed.

Potatoes and Substitutes

Fried, french-fried, creamed, scalloped, au gratin.

Fats

Gravy, fried foods, creamed foods, butter.

Salads

Coleslaw and other salad dressings. These may be eaten at home but will likely have too much dressing in a restaurant, canned fruit, or gelatin salads.

Breads

Sweet rolls, coffee cake.

Vegetables

Creamed, scalloped, au gratin.

Desserts

Puddings, custard, pastry, sweetened fruits.

Beverages

Chocolate milk, cocoa, milk shakes, regular soft drinks.

Fast Food Dining

Fast food dining is becoming increasingly popular in our society, mainly because of their convenience. You may experience the dilemma of trying to select a meal from the menu of high-calorie, high-fat foods, while attempting to stay within your calorie allowance for the day. Many of these restaurants have prepared literature that converts fast food items into diabetic exchanges.

It is helpful to ask for a guideline (or use the one provided in this booklet) to plan your meal. The following pages contain some fast food exchange equivalents.

EXCHANGES

ARBYS

Item	Calories	Starch/Bread	Meat	Fat	Veg
Reg. Roast beef Sandwich	350	2	2 med. Fat	1	----
Hot ham/cheese Sandwich	292	2	3 med. Fat	---	----
Tossed salad with low calorie Italian dressing	57	---	---	---	1
Turkey deluxe Sandwich	375	2	3 med. Fat	---	----
Chicken Salad Sandwich	386	2	2 med. Fat	3	----

BURGER KING

Hamburger on a bun	330	2	2.5	3	----
Cheeseburger on bun	380	2	3	4	----
Double meat hamburger/cheese on a bun	600	2	6	7	----
Whopper	640	3	3.5	8	----
Whopper/cheese	730	3	4	9	----
French fries (med)	370	3	---	4	----
Onion rings	310	2.5	---	3	----

DAIRY QUEEN

Single Hamburger	360	2	2 med. Fat	1	----
Hot Dog**	280	1.5	1 med. Fat	2	----
Fish Sandwich**	400	3	2 med. Fat	1	----
Chicken Nuggets (white)	276	1	2 med. Fat	1	
1 BBQ Nugget Sauce	41				
French Fries	200	1.5	---	2	----
Cone*	240	2.5		1	----
Chocolate Sundae*	190	2	---	1	----
Dilly Bar*	210	1.5	---	2	----
DQ Sandwich	140	1.5	---	1	----

McDONALDS

Item	Calories	Starch/Bread	Meat	Fat	Veg
Hamburger on a bun	260	2	1.5	1.5	-----
Cheeseburger on bun	318	2	2	2.5	-----
Quarter pounder	410	2	3	4	-----
Quarter pounder With cheese	510	3	2.5	5	-----
Big Mac	500	3	3	5	-----
Filet-o-fish on a bun	370	2.5	2	4	-----
6 pc Chicken McNuggets	270	1	2.5	3	-----
McChicken Sandwich	415	2.5	2.5	4	-----
Egg McMuffin	280	2	2.5	2	-----

DOMINO'S PIZZA

Cheese pizza (16" lg) 2 slices	376	4	2 med. Fat	1	-----
Sausage/Mushroom (16" lg) 2 slices	430	4	2 med. Fat	1	-----

PONDEROSA STEAK HOUSE

Extra cut prime rib	409	---	7	3	
Prime rib	286	---	5	2	
T-bone steak	374	---	8.5	6	
Sirloin tip	277	---	6	4	
Rib eye	259	---	6	3	
Chopped beef	324	---	6	3	-----
Shrimp	220	.5	3	1	-----
Baked Potato	145	2	---	---	-----
French fries (3 oz)	230	2	---	2	-----

WENDY'S

ITEM	CALORIES	Starch/Bread	MEAT	FAT	VEG
Single hamburger, plain	350	2	3	3	-----
Double hamburger	670	2	6	6	-----
Single cheeseburger	580	2	4	2.5	-----
Double cheeseburger	800	3	6	3	-----
Chili (small)	190	1.5	2.5	1	-----
French fries	330	3	---	3	-----
Grilled Chicken Sandwich	290	2.5	3	1.5	-----
Breaded Chicken Sandwich	450	3	3	4	-----
Deluxe Garden Salad	110	0.5	1	1	1

MIGHTY TACO

Mighty Taco soft shell	239	1.5	2	2	-----
Vegetarian Taco soft shell	244	1	---	3	-----

KENTUCKY FRIED CHICKEN

3 piece Dinner original	830	4	6	2	-----
crispy	1070	5	6.5	6	-----
2 piece Dinner original	595	3.5	4	1.5	-----
crispy	665	2.5	4.5	3.5	-----



Sick Day Meal Planning

Often an illness such as a cold or the flu will cause you to lose your appetite. It is important that you continue to eat and drink, especially if you take insulin or a diabetes pill. If you have difficulty eating, switch to soft or liquid foods that are easy-to-digest. Try to follow your meal plan as closely as possible. The following lists will help you select foods to eat when you are sick. In order to plan meals for different calorie levels, both the caloric and exchange values are listed. Some of these foods will contain a lot of sugar and should be eaten only when you are ill.

EASY-TO-EAT FOODS FOR SICK DAYS

Bread Exchanges	Amount (for 1 exchange)	Approximate Calories
Bread:		
White, whole wheat	1 slice	70
White whole wheat-toasted	1 slice	70
Cereal, hot	1 cup	70
Crackers:		
Saltines	6 (2" square)	75
Soda crackers	4 (2.5" square)	70
Graham crackers	2 (2.5" square)	70
Ice cream (vanilla, chocolate, strawberry)	1/2 cup (omit 2 fat, 1 starch/bread exchanges)	170
Ice milk (vanilla, chocolate, strawberry)	1/2 cup (omit 1 fat exchange)	115
Jams/jellies, regular	1 level teaspoon	55
Jello, regular	1/3 cup	80
Popsicle*	1/2 twin pop	40
Pudding, plain (made with nonfat milk)	1/4 cup	70
Sherbet	1/4 cup	65
Soft drinks:		
Cola	4 ounces	55
Ginger ale	6 ounces	60
Soups:		
Broth type	3/4 cup	80
Cream type (made with water)	1 cup (omit 1 fat exchange)	120

Sugar *white granular	4 level teaspoons	60
Tapioca: Whole milk, plain	1/3 cup	75
Cottage cheese (1-2% low-fat) Creamed	1/4 cup 1/4 cup (omit 1/2 fat exchange)	60 75
Custard, baked	1/2 cup (omit 1 starch/bread exchange)	150
Egg substitute, low cholesterol	1/4 cup	50
Egg, soft cooked or poached	1 (omit 1/2 fat exchange)	80
Eggnog, *commercial	1/2 cup (omit 1 starch /bread and 1 fat exchange)	170
Yogurt, *plain, skim milk	1 cup (omit 1 starch /bread exchange)	120
Yogurt, *plain, whole milk	1 cup (omit 1 starch /bread and 1 fat exchange)	170
Tomato juice	1/2 cup	20
Vegetable cocktail	1/2 cup	25

Milk Exchanges

Eggnog *(non alcoholic) commercial made with whole milk	1/2 cup (omit 2 fat exchanges)	170
Yogurt, *Plain, skim milk	1 cup (omit 1 fat exchange)	120
Yogurt, *plain, whole milk	1 cup (omit 2 fat exchanges)	170
Warm milk, skim	1 cup	80

Warm milk, low-fat	1 cup (omit 1 fat exchange)	125
Warm milk, whole milk	1 cup (omit 2 fat exchanges)	170
<i>Fruit Exchanges</i>		
Fruit juices, unsweetened, Apricot, cherry, grapefruit, orange, peach	1/2 cup	40
Apple, pineapple	1/3	40
Grape, prune, cranberry	1/4	40
Applesauce, unsweetened	1/2 cup	40
Applesauce, sweetened	1/8 cup (2 tablespoons)	30
Popsicle*	1/2 twin pop	40
Sugar* granular	1 level tablespoon	45
<i>Fat Exchanges</i>		
Margarine	1 teaspoon	45
<i>Free Foods</i>		
Fat-free broth, boullion		
Coffee, regular or decaffeinated		
Tea		
Postum		
<p>*Several foods have been included under more than one list to facilitate working them into your individualized meal plan.</p>		

SAMPLE SICK DAY MENU

The following is a sample sick day diet menu. It contains approximately 1600 calories/day.

	Exchange Plan	Sample Menu
Breakfast	1 Fruit 1 Starch/Bread 1/2 Milk (2%)	1/2 cup grapefruit juice 1/2 cup cooked cereal 1/2 cup milk(2%)
Mid-morning	2 Fruit 1 Starch/bread 1 Fat 1/2 Milk (2%)	1/2 cup orange juice 1 slice toast with 1 teaspoon margarine 1/2 cup milk (2%)
Lunch	2 Medium fat meat 2 Starch/bread 1 Fruit 1/2 Milk (2%)	1/2 cup cottage cheese 2/3 cup plain pudding 1/2 cup pineapple juice 1/2 cup milk (2%)
Mid-afternoon	1 Fruit 1 Starch/bread 1/2 Milk (2%)	1/2 cup apple juice 1/4 cup sherbet 1/2 cup milk (2%)
Evening meal	1 Fruit 1 Starch/bread 1 Milk (2%) 2 Medium fat meat	1/2 cup apple juice 3/4 cup chicken noodle soup 1 cup milk (2%) 2 soft cooked eggs
Bedtime	1 Starch/bread 1 Milk (2%)	1/3 cup regular Jello 1 cup milk (2%)

Medications Used to Treat Diabetes

Oral Medications for Type 2 Diabetes

Many people with diabetes are still capable of producing some insulin from their pancreas but perhaps not enough to help their bodies utilize the food that they eat. In this particular instance, dietary management is the most important method of control of blood sugar.

In addition to diet, some people may benefit from using oral blood sugar lowering pills. These pills are chemicals that work by stimulating the pancreas to produce more of its own insulin. More recently, the pills have also been shown to help the body cells make more efficient use of the insulin that is produced. The overall result of these two functions is a lower blood sugar level. These pills are not insulin. Insulin cannot be taken by mouth because the digestive juices in the stomach destroy it. Therefore, insulin that is taken by mouth cannot lower blood sugar. Insulin must be injected with a needle to be effective.

There are a number of diabetic pills that are grouped together and classified by their method of action.



Oral Medications for Type 2 Diabetes

Class	Generic Name	Dose	Brand Names	How to Take	Comments/ Cautions
Sulfonylurea Note: all in this class have the potential for hypoglycemia	acetohexamide	0.25-1.5Gm	Dymelor	1-2 times/day	
	chlorpropamide	0.1-0.5 Gm	Diabinese	Once a day	Possible side effects with alcohol
	glimepiride	1-8 mg	Amaryl	Once a day	
	glipizide	10-20 mg	Glucotrol, Glucotrol X1	1-2 times/day before meals	
	glyburide	2.5-20 mg	Diabeta, Glynase PresTab, Micronase	1-2 times/day	Effects may last all day
	tolazamide	0.1-1.0 Gm	Tolinase	1-2 times/day	
	tolbutamide	0.5-3.0 Gm	Orinase	2-3 times/day	Short acting-good choice if kidney problems
Biguanides	metformin	500-2550 mg	Glucophage Glucophage XR	2-3 times/day once a day Take with meals.	No weight gain. No hypoglycemia if used alone. Side effects: nausea, diarrhea, and loss of appetite. Not to be taken with kidney problems, severe congestive heart failure, or heavy alcohol intake. Stop drug day before contrast dye procedure.
Sulfonylurea/ Biguanide Combination	Glyburide/ metformin	1.25/250- 5/500	Glucovance	1-2 times/day	See cautions for metformin and glyburide above



Alpha-Glucosidase Inhibitors	acarbose	25- 100 mg	Precose	With first bite of each meal	Side effects: gas bloating, diarrhea
	miglitol	As above	Glyset	As above	As above
Thiazolidinediones	rosiglitazone	4-8 mg	Avandia	1-2 times/day	Side effects: edema, weight gain. Not to be taken with liver disease or severe congestive heart failure
	pioglitazone	15-45 mg	Actos	Once a day	Same as above
Meglitinide	repaglinide	0.5- 4 mg	Prandin	Right before meals	Don't take if skipping a meal.
	nateglinide	120 mg	Starlix	Same as above	Same as above

Important Things to Know About the Pills

1. Oral hypoglycemic pills may cause some side effects (nausea, vomiting, diarrhea and skin rash) and possible complications. If any of these things occur, notify your doctor. They should be used only *as directed* by a physician. The dose should *never be changed* except by your *doctor*.
2. The pills are capable of producing blood sugars below normal, therefore, it is important to eat regular meals. Do *not skip* meals!
3. Be careful when mixing alcohol and diabetes pills. Alcohol tends to cause low blood sugar and when taken with these diabetes pills, may produce harmful and uncomfortable side effects.
4. Pills for diabetes work in different ways to lower blood sugar.
 - a. *Sulfonylurea* pills like glyburide, glipizide and glimepiride lower blood sugar by stimulating the pancreas to produce more insulin. Other types of pills such as metformin (Glucophage), rosiglitazone (Avandia) and pioglitazone (Actos) make the body more responsive to insulin and are called “insulin sensitizers.”
 - b. *Alpha-Glucosidase Inhibitors* such as acarbose (Precose) and miglitol (Glyset) delay the absorption of carbohydrate after eating.
5. Sometimes a combination of pills and insulin is the most effective treatment for type 2 diabetes. A common dosing schedule is pills during the day and intermediate acting insulin, i.e. NPH at bedtime.

Use of Insulin

Some people with diabetes have little or no insulin being produced from his/her pancreas. These individuals have type 1 diabetes and must take insulin by injection daily.

Commercial insulin is made by synthetically producing human insulin made from a germ (*E. coli*) and DNA found in genes.

There are four major groupings of insulin:

1. *Rapid* acting insulin, e.g. Humalog, Novolog
2. *Short* acting insulin e.g. Regular
3. *Intermediate* acting insulin e.g. NPH, Lente
4. *Long* acting insulin e.g. Ultralente, Lantus

It is important for all people who are taking insulin to understand how insulin works for them.

These insulins work differently, the lengths of time they work and the peak actions or times at which they work their hardest to lower the blood sugar. It is important for all people who are taking insulin to understand how insulin works for them. Some people need more than others. It does not mean that the more insulin a person takes, the more severe the diabetes. It is just that our bodies use drugs differently and the dosage is variable.



Insulin Comparison Chart

Rapid Acting Insulins

Action: Onset: <15 min.; Peak: 1-2 hours; Duration: 5 hours

Product	Manufacturer	Form
Humalog	Lilly	Human
Humalog Cartridge (1.5 ml.)	Lilly	Human
Humalog Pen (3.0 ml.)	Lilly	Human
Novolog	NovoNordisk	Human
Novolog Cartridge (3.0 ml.)	NovoNordisk	Human

Short Acting Insulin

Action: Onset: 1/2-1 hour; Peak: 2-4 hours; Duration 6-8 hours.

Product	Manufacturer	Form
Humulin R (Regular)*	Lilly	Human
Iletin II Regular	Lilly	Pork
Humulin R Cartridges (1.5ml.)	Lilly	Human
Novolin R	NovoNordisk	Human
Novolin R PenFill (1.5 and 3 ml.)	NovoNordisk	Human
Novolin BR (Velosulin: Reg. Buffered)	NovoNordisk	Human
Novolin R (Reg) Prefilled (1.5 ml.)	NovoNordisk	Human

Intermediate Acting Insulins

Action: Onset: 2-4 hours; Peak: 6-12 hours; Duration 22-24 hours

Product	Manufacturer	Form
Humulin L (Lente)	Lilly	Human
Humulin N (NPH)	Lilly	Human
Iletin II Lente	Lilly	Pork
Iletin II NPH	Lilly	Pork
Humulin N Cartridges (1.5, 3 ml.)	Lilly	Human
Novolin L (Lente)	NovoNordisk	Human
Novolin N (NPH)	NovoNordisk	Human
Novolin N Penfill (1.5, 3 ml.)	NovoNordisk	Human
Novolin N Prefilled (1.5 ml.)	NovoNordisk	Human

Long Acting Insulins

Product	Manufacturer	Form	Action
Humulin U (Ultra Lente)	Lilly	Human	Onset: 4-6 hours Peak: 14-20 hours Duration: 28-36+ hr.
Lantus (insulin glargine)	Aventis Pharmaceuticals	Human	Onset: 1.1 hour Peak: None Duration: 30 hours

* All Insulins available as U-100. Humulin R (Regular) also available in U-500 strength.



Guidelines for Insulin Administration

General Considerations

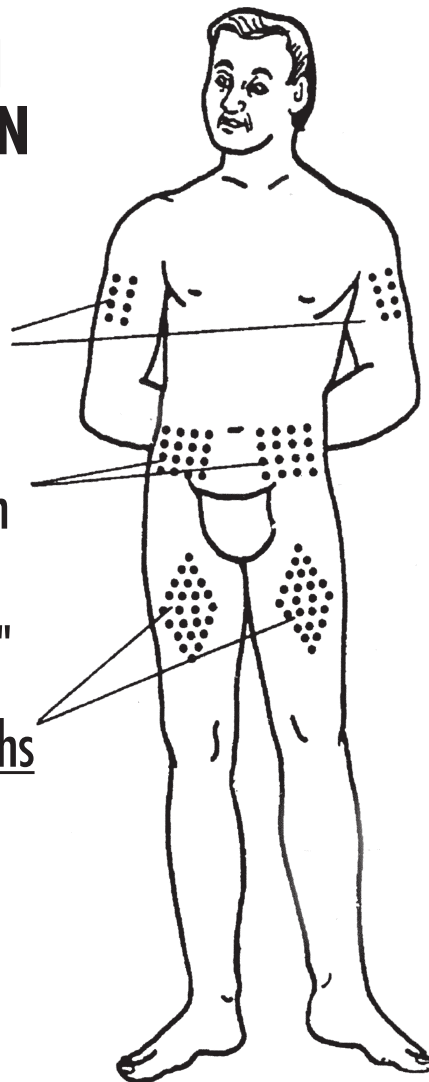
1. Always check the bottle of insulin for the following information:
 - a. *Strength* of insulin - e.g., U-100
 - b. *Type of insulin* - e.g., NPH
 - c. *Date of expiration* - e.g., December 2005
 - d. Match the syringe you are using with the strength of insulin you are using, e.g. U-100 syringe with U 100 insulin.
2. Always keep *two* bottles of insulin on hand: one in the refrigerator for *storage* (do not allow it to freeze) and the one you are using which may be kept at room temperature for 30 days.
3. When disposing of needles and syringes, always put them in a separate container, one away from other waste materials, to avoid injury to anyone who may come in contact with the household trash. The container should be rigid, leak proof and puncture resistant. Recommended containers are hard, plastic laundry detergent or fabric softener bottles. If using a coffee can, needles should be broken first and then heavy-duty tape should be used to secure the plastic lid.
4. Always change the *sites* of injection daily to avoid tissue damage or abscess formation. Sites for injection frequently used are:
 - a. Both *arms* - fatty part of arm on the outer back area
 - b. Both *thighs* - fronts of legs, top and outer side
 - c. Both sides of the *abdomen* - 1 1/2" on either side of the belly button

INSULIN INJECTION SITES

Both Arms

Both Sides of the
Abdomen 1 1/2 Inch
on Either Side of
the "Belly Button."

Both Thighs



ADMINISTRATION OF INSULIN

SINGLE DOSE

1. Be sure hands are clean before starting.



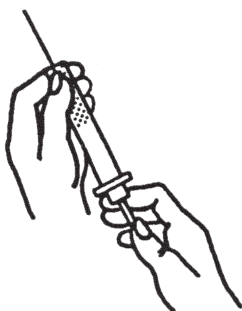
2. Mix insulin by rolling bottle between the palms of the hands...
DO NOT SHAKE...



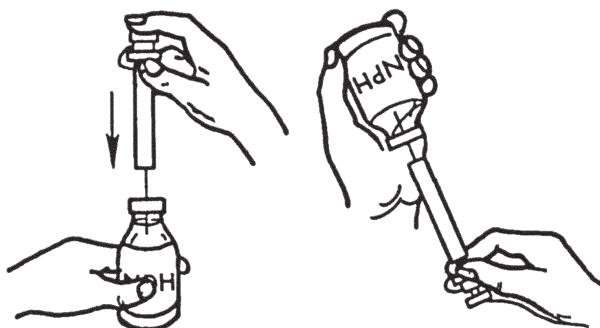
3. Wipe rubber stopper on insulin bottle using an alcohol swab...



4. Fill syringe with air equal to the amount of insulin needed.



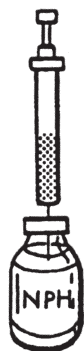
5. Push air into bottle, (prevents a vacuum inside the bottle) then turn syringe and bottle upside down...



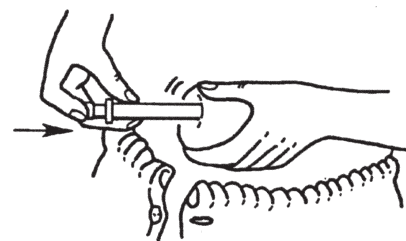
6. Pull plunger down beyond desired dose, remove air bubbles from syringe...
(as a large bubble of air may replace insulin), then push back to the desired amount...



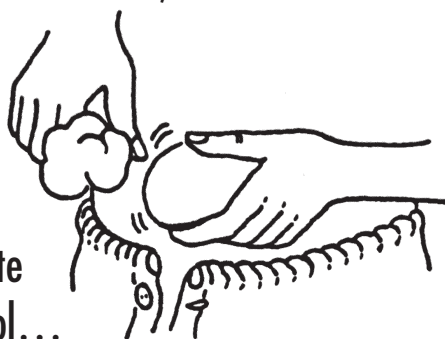
7. Turn bottle right side up and keep needle in bottle until ready to use...



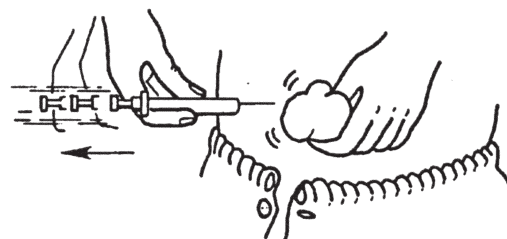
10. Inject (push plunger in) insulin into the skin...



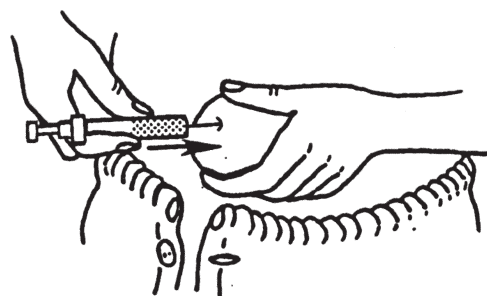
8. Select site to be used for injection... (arms, thighs, abdomen), and cleanse injection site with alcohol...



11. Remove needle quickly while applying pressure to skin with alcohol pad.



9. Pinch skin together to gather loose fatty tissue... insert needle at a 90° or 45° angle (if thin) into skin... until the needle is all the way into the skin...



12. Destroy the disposable syringe and needle after a single dose...



MIXED DOSE

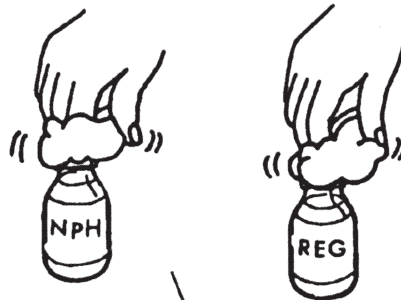
1. Wash hands.



2. Roll bottles between hands...



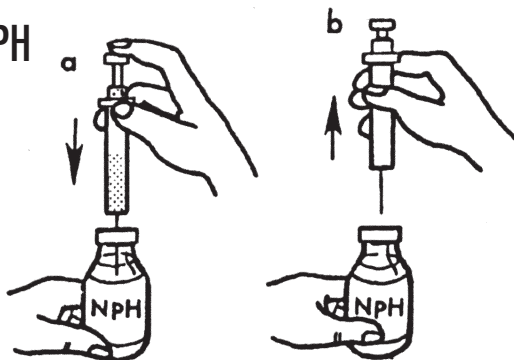
3. Wipe both bottles with alcohol.



4. Fill syringe with air equal to the number of units of NPH or LENTE to be withdrawn...

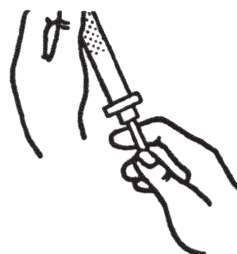


5. Insert needle into the NPH or LENTE bottle and INJECT the AIR (a)

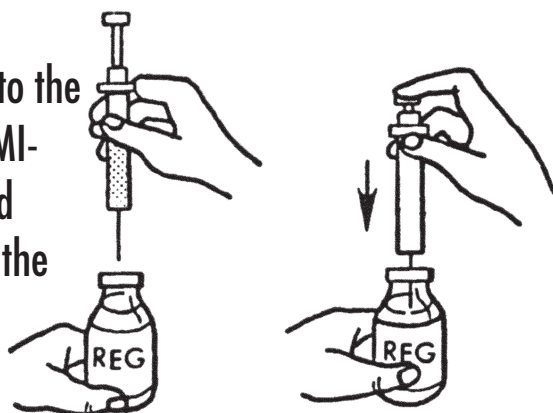


REMOVE the NEEDLE from the NPH or LENTE bottle (b)...

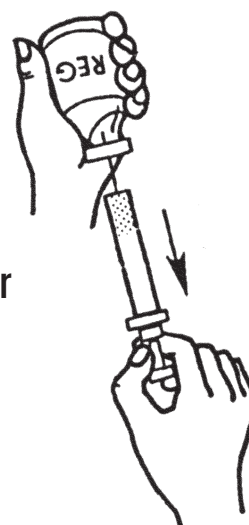
6. Fill syringe with air equal to the number of units of REGULAR or SEMI-LENTE to be withdrawn...



7. Insert needle into the REGULAR or SEMI-LENTE bottle and INJECT AIR into the bottle...



8. Turn bottle upside down and pull plunger DOWN beyond desired dose of REGULAR or SEMI-LENTE. Then push plunger up to the proper amount...

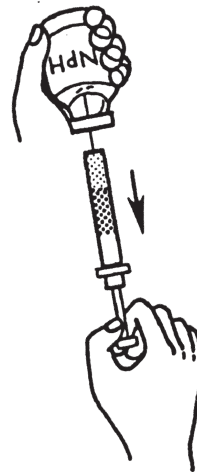


REMOVE NEEDLE CAREFULLY FROM BOTTLE...

9. Then, turn NPH or LENTE bottle upside down, and insert needle into the bottle. BE CAREFUL not to inject the REGULAR into the NPH...



10. Pull plunger DOWN slowly to a total of NPH + REGULAR E.G. 20U NPH + 10U REGULAR = 30U total amount of insulin.



11. Turn bottle right side up and leave needle in bottle until ready to inject. Then proceed as described in a single dose injection...



(FOLLOW STEPS #8 - 12)

Exercise and Diabetes Mellitus

Exercise is one of the most important factors related to the body's ability to utilize sugar for energy production (metabolism).

Physical activity is essential in helping promote health, vigor and good spirits. The most important benefits of *regular exercise* are the following:

1. Improved circulation and cardiovascular fitness
2. Development of good muscle tone
3. Increased sense of well-being
4. Promotion of good digestion
5. Increased respiratory capacity
6. Utilization of glucose - muscles use glucose as fuel and convert it to energy, resulting in the burning up of calories and weight control - the more *active* an individual is, the *less* insulin required

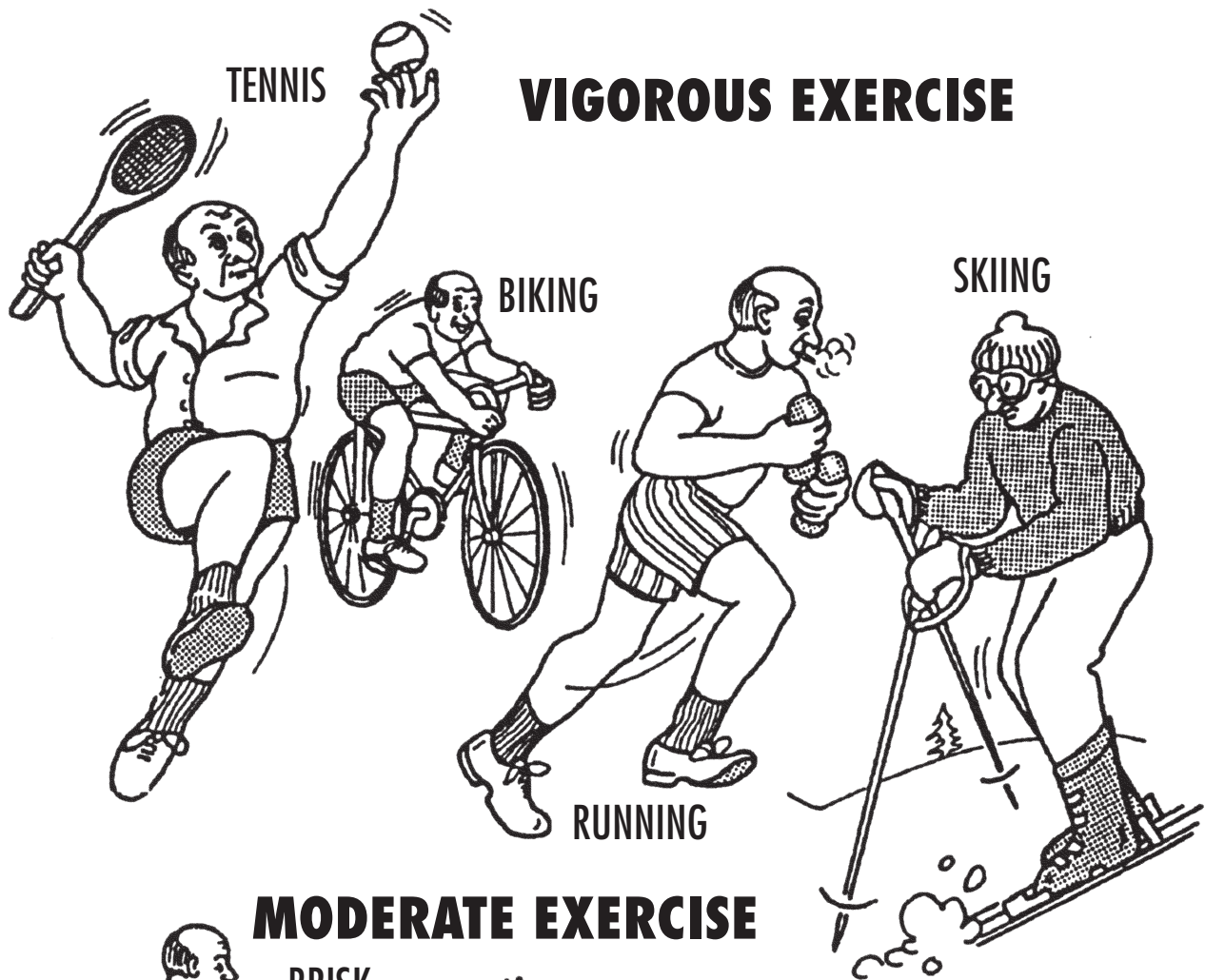
Unless you have other physical limitations, such as a heart condition, a moderate amount of *aerobic exercise is desirable for all people with diabetes* at least 5 days per week. The type of exercise should be discussed with your physician. Exercise must be balanced with food intake and medication (insulin or oral agents).

Your level of activity will be determined by your age and your present physical condition. Walking is probably the easiest and most inexpensive way to begin an activity program. Brisk walking can be done outdoors in pleasant weather and indoors during cold or rainy weather by walking in large enclosed shopping malls, joining a gym, or using a stationary bike, or climbing stairs.

Before doing vigorous exercises, everyone needs a warm up period. Spend three to five minutes stretching, particularly to loosen leg and calf muscles. Just as important as a warm-up period is at least **five** minutes of cool down. For example, if you have been jogging, walk at least a quarter of a mile in order to cool down.

It is important to remember that exercise should be regular, consistent and the same quantity every day. Sudden changes in your exercise activity can alter or upset the balance between insulin need and food requirements. Imbalances may bring about an insulin (hypoglycemic) reaction including symptoms of excessive sweating, faintness, hunger, shakiness or dizziness. To avoid these symptoms, attempt to compensate for variations in activity prior to the activity by eating additional food.





TENNIS

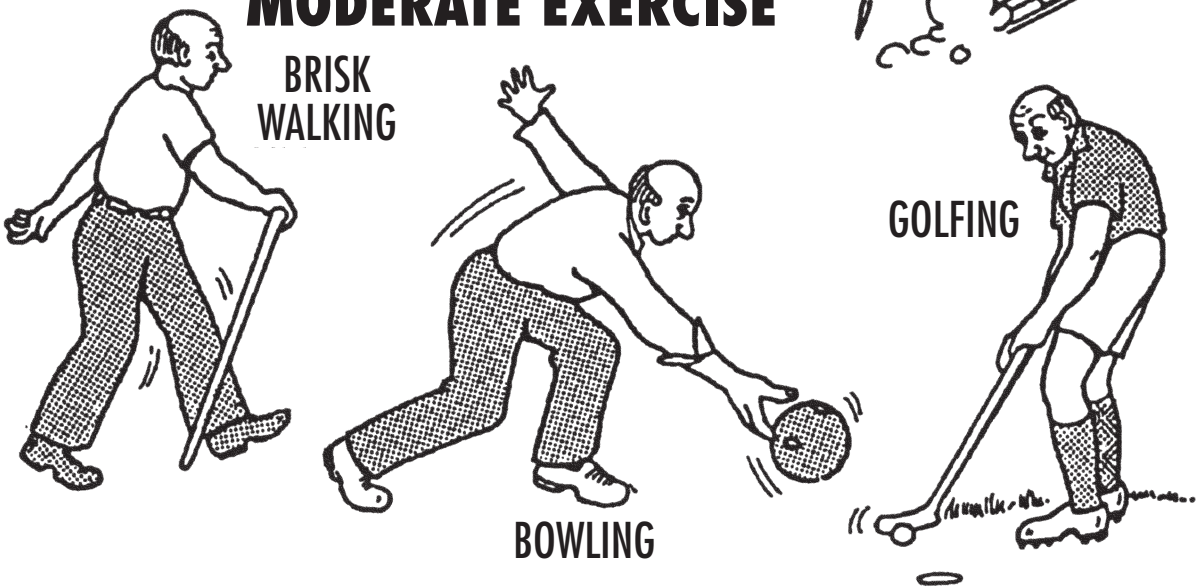
VIGOROUS EXERCISE

BIKING

SKIING

RUNNING

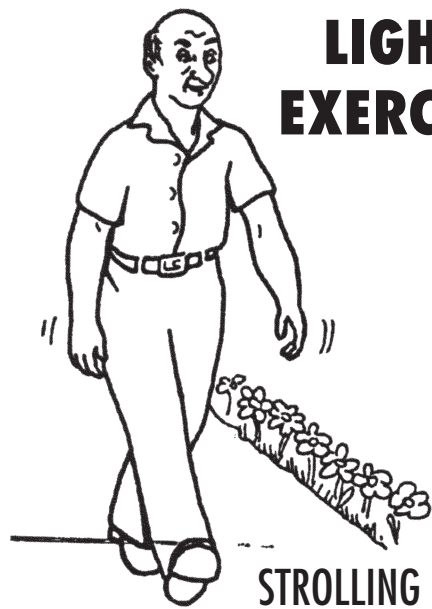
MODERATE EXERCISE



BRISK
WALKING

BOWLING

GOLFING



**LIGHT
EXERCISE**

STROLLING



SEWING

DRIVING



OVER EXERCISE

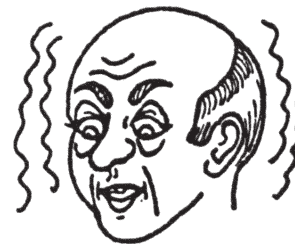
CAN BRING ABOUT AN INSULIN REACTION
WITH SYMPTOMS OF:



DIZZINESS

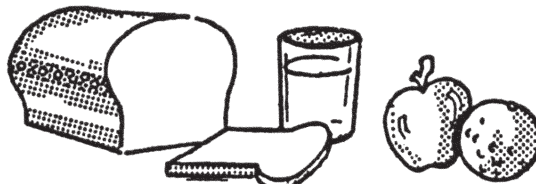


SWEATING



**NERVOUSNESS
OR SHAKINESS**

**COMPENSATE FOR OVER EXERCISE...EAT AN
EXTRA PIECE OF FRUIT OR SLICE OF BREAD.**



Occupational	Recreational	Household
Light Activity - 100-240 Calories Per Hour		
Auto Driving Desk Work Typing/Calculating Machine Hammering Nails Machine Sewing/Tailoring Using Hand Tools Auto Repair Radio and TV Repair Sawing (Power Hand) Sweeping	Darts Knitting/Sewing Building Models Playing Cards Standing/Walking (2 mph) Bowling Cycling (5 mph) Golf (Power Cart) Wood Working (Light)	Cooking Sewing Painting Washing Dishes Washing Cars Dusting/Polishing Furniture Ironing Mowing Lawn Vacuum Cleaning Washing Clothes
Moderate Activity - 240-350 Calories Per Hour		
Brick Laying/Masonry Machine Assembly Plastering Plowing (Tractor) Remodeling or Repair (Interior) Truck Driving Window Washing Carpentry Waitressing and Bussing Painting/Paper Hanging Table Tennis Tennis (Doubles)	Badminton Cycling (6 mph) Fly/Stream Fishing (Standing with Waders) Golf (Pulling Bag Cart) Horseback Riding (Sitting to Trot) Volleyball Walking (3 mph) Calisthenics Dancing (Foxtrot)	Hanging Wash Making Beds Mopping Mowing Lawn (Power Moser) Scrubbing Floors Changing Tires Raking Leaves Digging Garden
Vigorous Activity - 420-660 Plus Calories Per Hour		
Remodeling (Exterior) Sawing Hard Wood Shoveling Heavy Earth Chop with Axe, Pick, Sledge Hammer Lifting and Carrying 45 or more Pounds Paddle Ball/Hand Ball/Racquet Ball Swimming	Dancing (Folk or Square) Skiing Tennis (Singles) Walking (5 mph) Basketball Jogging/Running (5 mph)	Lawn Mowing (by Hand) Snow Shoveling Splitting Wood Moving Furniture (75 pounds or more)

Exercise Do's and Don'ts

Do's

1. Do have a physical exam before beginning an activity program.
2. Do begin the exercise program gradually to build up your endurance and avoid straining.
3. Do some exercise regularly – 5-7 days a week, if possible, about the same time each day.
4. Do *wait one* hour after a meal to exercise but not more than 3 hours.
5. Do carry a *quick sugar source* with you for quick energy when reactions occur (i.e. packet of sugar, cake gel).
6. Do *choose properly fitting and comfortable shoes* for the type of exercise you plan to do.
7. Do *drink lots of liquids* to replace body fluids lost through perspiration.



Don'ts

1. Don't start an exercise program if your *diabetes is uncontrolled*, if you have *heart problems*, or are more than 50 pounds overweight without seeing your doctor first.
2. Don't go on a crash exercise program.
3. Don't exercise in *excessive heat* or humidity.
4. Don't exceed the point of fatigue or sweating.
5. Don't try to *pick up where you left off in an exercise program* if you have not exercised for an extended period. Begin again gradually.

Blood Glucose Testing

Because the amount of sugar the kidney can hold before it spills over into the urine is not the same for everyone, urine testing is not an accurate method to determine blood glucose control. Urine sugar testing cannot accurately determine hypoglycemia (low blood sugar). For these reasons, home blood glucose testing instead of urine testing is used to monitor glucose control.

Blood glucose testing is a procedure that can be performed in the home without costly laboratory equipment. The technique can be performed easily by almost anyone and is used by individuals with both type 1 and type 2 diabetes. Monitoring your blood glucose levels will provide you and your doctor/nurse valuable information necessary to keep your blood sugar levels within a normal range. It is a good idea to keep a diary or logbook of your home glucose readings and bring them to your office visit.

There are many different glucose meters for home glucose testing. For more information about which meter is right for you, ask your doctor or diabetes educator.

It is a good idea to keep a diary or logbook of your home glucose readings.

Urine Testing for Ketones

Ketones are formed in the blood and urine when the body fails to produce enough insulin. Therefore, instead of using the food you eat for energy, you begin to burn stored body fat for energy. The by-products of this breakdown of body fat are called ketones (fatty acids and acetone). As the fatty acids build up in the blood stream, a state of acidosis occurs. This often causes diabetic coma. Ketones or acetone in the urine are frequently a *warning* sign of impending diabetic coma and should never be ignored. Call or visit your doctor if you see a moderate or large amount of ketones in the urine.

People with type 1 diabetes must check urine for ketones when:

1. Newly diagnosed and still learning to balance insulin needs.
2. Blood sugar is 240 or greater and feeling nauseated, stomach pain or vomiting.
3. Sick with infection, cold, flu, or fever.
4. Losing weight and don't know why.

Products available for testing urine ketones include: KetoDiastix, Ketostix, and Chemstrip K. For questions on how to perform the test, read package instructions and/or contact your diabetes educator.





Blood Glucose Testing Record

Name:	Month:
-------	--------

Day of Month	Morning Blood	Lunch Blood	Dinner Blood	Bedtime Blood	3 AM Blood
1					
2					
3					
4					
5					
6					
7					
8					
9					
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Foot Care

Care of the Feet

Many people with diabetes develop a problem with poor circulation (hardening of the arteries) and some have problems with numbness and burning (neuropathy) of the feet. Any injury of the feet, when either situation is present, may cause an infection and delayed healing.

Daily Foot Care Measures

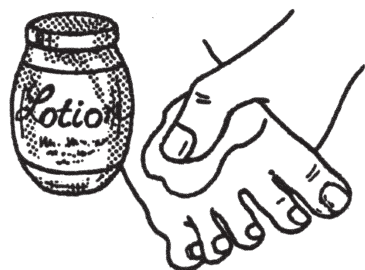
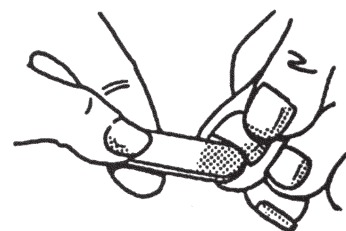
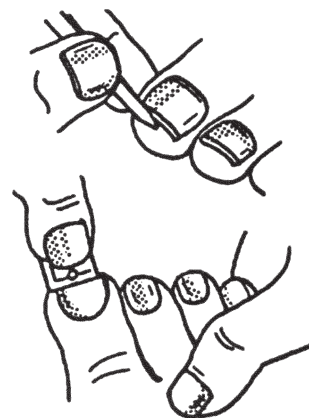
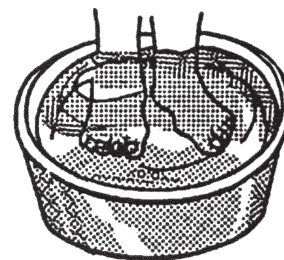
Inspect the feet daily - note the presence of:

1. Cuts, scratches, bruises, blisters, corns and calluses.
2. *Athlete's foot* - especially between the toes - dry, scaly, flaky areas.
3. *Lack of feeling* - in the feet.
4. *Changes in color of the feet* - blue or purple, may indicate poor circulation.
5. *Change in temperature* - cold feet may indicate poor circulation.
6. *Wash feet daily: bathe*, do not soak, daily using warm water and mild soap. Test water temperature with elbow.
7. Dry feet well, especially between toes. You may use a small hand towel for this purpose.
8. For excessively dry feet, apply a good lotion (lanolin, oil, Vaseline) to prevent skin from cracking. Do not apply between toes.
9. When feet sweat, apply a foot powder. If fungus infection develops, use an antifungal powder. Consult with the doctor immediately.

Trimming Toenails

1. Soak feet in basin of warm water for 10-15 minutes.
2. Dry feet well.
3. Use an orange *stick* to remove debris from under the nail.
4. Trim nails with toenail clipper or special toenail scissors.
5. Cut nails straight across, clipping small sections of the nail at a time.
6. File nails smooth with an emery board or nail file.
7. Do not trim your own nails if:
 - a. Vision is very poor.
 - b. Your circulation is poor.
 - c. You have hard, thick nails that are too difficult to cut.

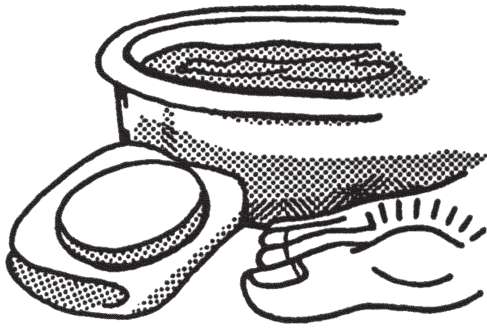
Instead - consult with a foot doctor (podiatrist).



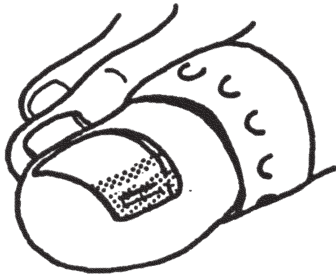
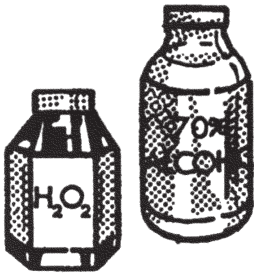
Care of Corns and Calluses

1. Keep corns and calluses soft with a lotion.
2. *Never use:*
 - a. Commercial corn removers
 - b. Razor blades
 - c. Knives
 - d. Household scissors
3. Consult with a *podiatrist* if corns and calluses become a major problem.

Treatment of Foot Injuries



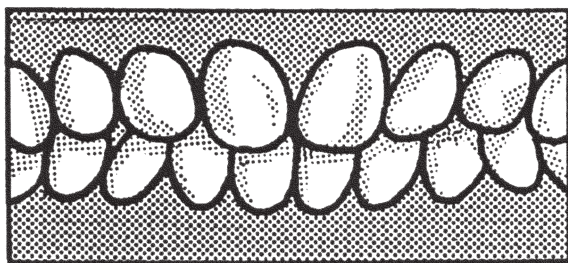
1. Wash affected area with soap and warm water.
2. Apply a mild antiseptic: hydrogen peroxide or alcohol. Do not use iodine.
3. If necessary, wrap affected area with sterile gauze band-aid to keep the wound clean.
4. Stay off the foot as much as possible to allow it an opportunity to heal. If area becomes red, painful, swollen it is likely to be infected. Consult with your doctor *immediately*. *Do not wait!!*



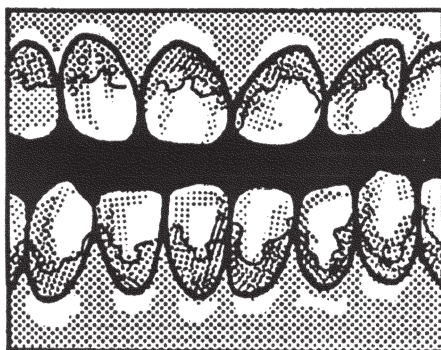
Self-Foot Care Check List

1. *Control* your diabetes carefully.
2. Keep feet clean and dry.
3. Always *protect* feet and legs from injury.
 - a. Wear clean wool or cotton socks and stockings.
 - b. Wear comfortable leather shoes.
 - c. Avoid open-toe shoes.
 - d. Break new shoes in gradually: (1-2 hours/day).
 - e. Do not use hot water bottle or heating pads that can burn the skin - you may not feel it.
 - f. Never walk around barefoot - always wear shoes or slippers.
 - g. Avoid use of harsh chemicals on the feet.
 - h. Inspect inside of shoe for foreign objects before putting the shoe on.
4. Promote good circulation
 - a. Avoid smoking - tobacco in any form produces constriction of the blood vessels.
 - b. Do *not* cross legs at the knees or hook legs around a chair.
 - c. Avoid use of restrictive garters, socks, and girdles.
 - d. Exercise feet and legs daily - walking is excellent.

Care of the Teeth



NORMAL HEALTHY GUMS



PLAQUE



PERIODONTITIS

What is gum disease?

People with diabetes may be more prone to infection than non-diabetics. Once an infection develops, it tends to be more severe and last a longer period of time. One of the most common types of chronic infection is inflammatory periodontal (gum) disease. It is also called pyorrhea, periodontitis or gingivitis. Gingivitis is the beginning stage of gum disease. This occurs when the soft tissue surrounding the teeth becomes inflamed. If the inflammation extends to include the bone supporting the teeth, the condition is then called periodontitis.

The most common cause of periodontal disease is bacterial *plaque*. Plaque is a colorless, sticky film of bacteria that forms continuously on your teeth. If not removed by daily brushing and flossing, it begins to thicken and change into a hard substance called *calculus* (tartar). When calculus builds up it creates an inflammation of the soft tissues surrounding the teeth called gingivitis.

Diabetes is not a direct cause of periodontal disease. When periodontal disease is present in a person with diabetes, oftentimes it increases the severity of the gum disease.

The most common symptoms of periodontal gum diseases include:

1. Bleeding gums when you brush and floss your teeth.
2. Presence of a sustained bad breath.
3. Soft, swollen or tender gums.
4. Pus extracted from the gum line when pressed.
5. Loose teeth.
6. Gums that shrink away from the teeth.
7. Any change in the way your teeth appear and/or come together.

Prevention of Dental Problems

Prevention of periodontal disease is achieved by a good home dental care program that includes the following:

1. Daily brushing.
2. The use of dental floss after brushing.
3. Rinsing mouth of food immediately after eating. It only takes five minutes for food debris to turn into bacteria.

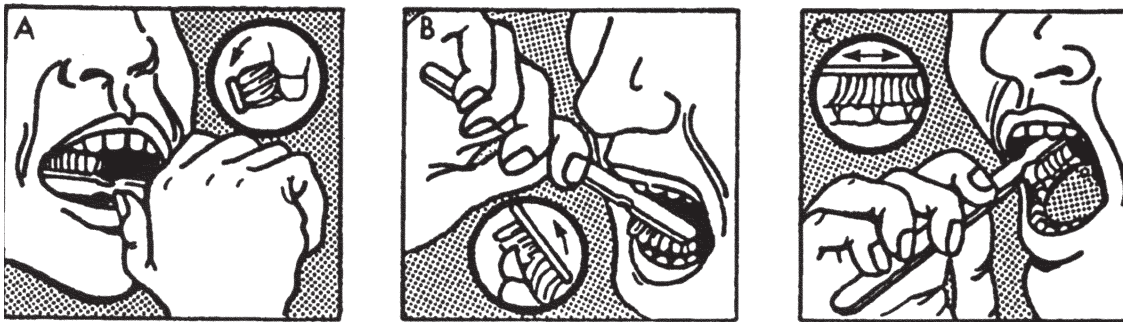
Please keep in mind that it is not the *frequency* of cleaning the teeth, as much as how *effectively* you do the job. Proper cleaning techniques should be provided by your dentist or dental hygienist at your regularly scheduled visits.

Instructions for Care of Dentures

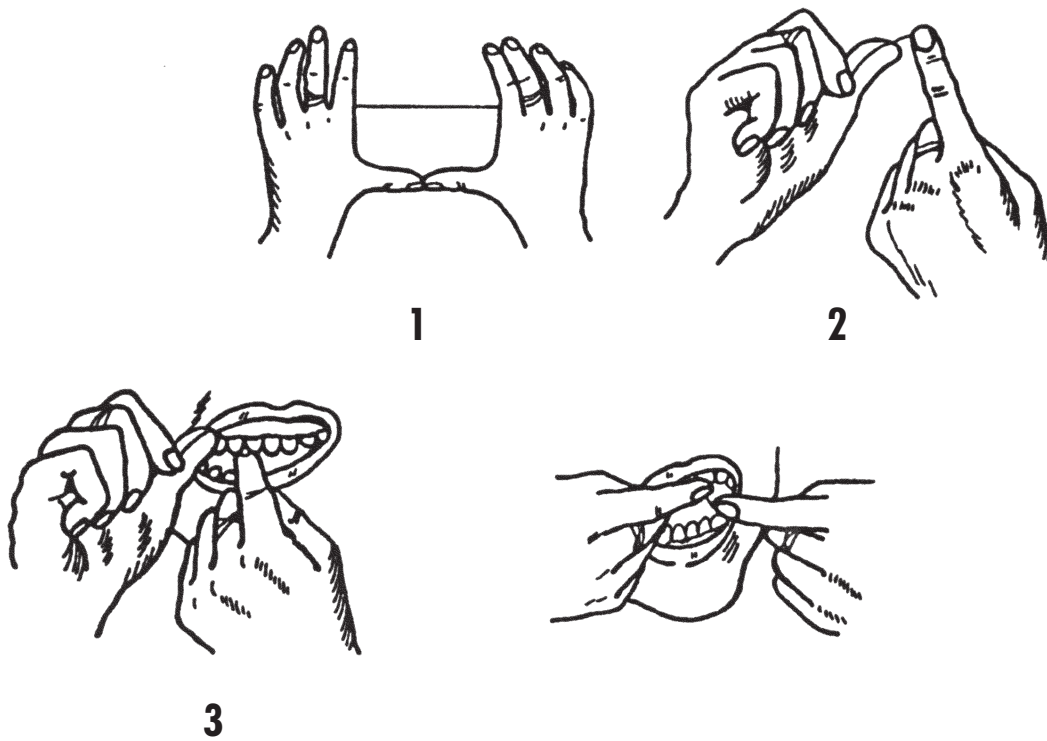
If you have already lost your own teeth and now must wear dentures, it is still important to provide good oral care that includes the following:

1. Cleaning dentures daily with proper brush and denture cleansing agent.
2. Removing the dentures when sleeping to allow gums to “breathe.”
3. If your dentures irritate any oral tissues, see your dentist right away. Also, periodic examinations for non-painful lesions are important.

1 DAILY BRUSHING



2 DENTAL FLOSSING



Complications of Diabetes

Acute Complications

Insulin Reaction/Shock (Hypoglycemia)

Definition:

A condition in which the plasma glucose falls below the normal range (less than 65 mg/dl). Hypoglycemia occurs from too much insulin in the blood and results in blood sugar levels that are too low. The level of glucose that produces symptoms of hypoglycemia varies from person to person and for the same person under different circumstances. Insulin reactions usually occur suddenly.

Causes:

- Taking too much insulin - as when you incorrectly measure your insulin.
- Skipping or delaying meals, i.e. instead of eating at your usual time (noon), you may not eat until later (3 p.m.).
- Not eating enough food at a meal.
- Strenuous exercise or work (more than usual).
- Drinking alcohol on an empty stomach when taking insulin or oral hypoglycemic pills or other medications.

Signs:

- Hunger
- Sweating
- Weakness
- Nervousness
- Shakiness
- Headaches
- Dizziness
- Seizure activity
- Blurred vision
- Tingling sensation of lips
- Nightmares
- Irritability
- Pale/clammy skin
- Unsteady gait (walk)



Treatment: 15 grams of fast acting carbohydrate

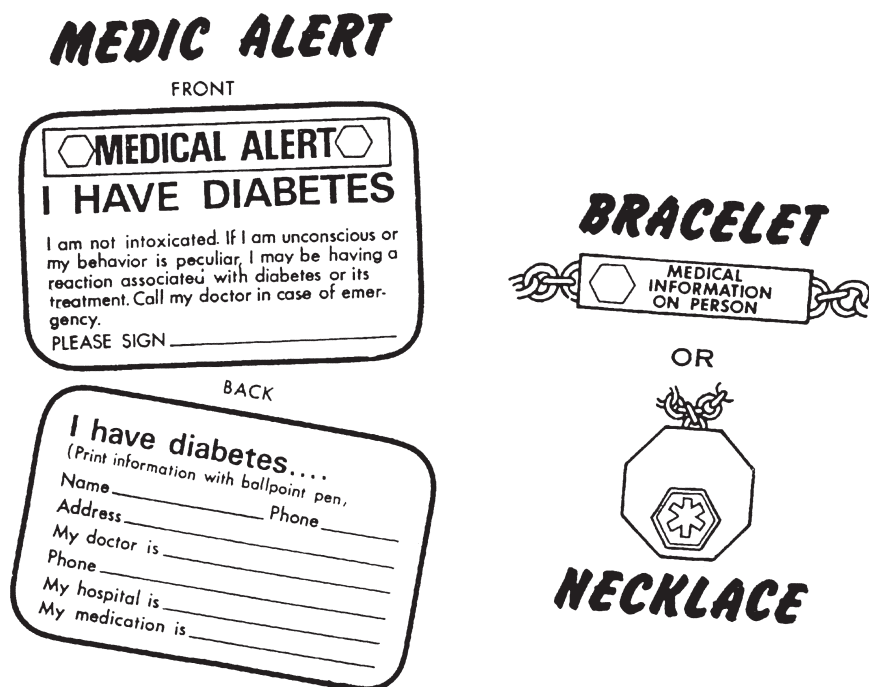
- 2 cubes of sugar or
- 1/2 glass of fruit juice (any kind) or
- 1/2 glass of ginger ale or cola (not diet) or
- 1/2 glass of skim milk or
- 2 tsp syrup (honey or Karo) or
- 4 - 6 Lifesavers or other hard candy you can chew and swallow or
- 1 tube of "instant glucose" - glucose, monogel or cake mate gel

If you do not feel better within 15 minutes - take more of one of the above. If you still do not feel better, perhaps what you may require is glucagon. Glucagon is a hormone normally produced by the pancreas gland whose function is to bring about the release of sugar from the liver when the blood sugar falls below normal. Glucagon can be obtained commercially as a medication and is *injected* with a syringe in the same manner as insulin.

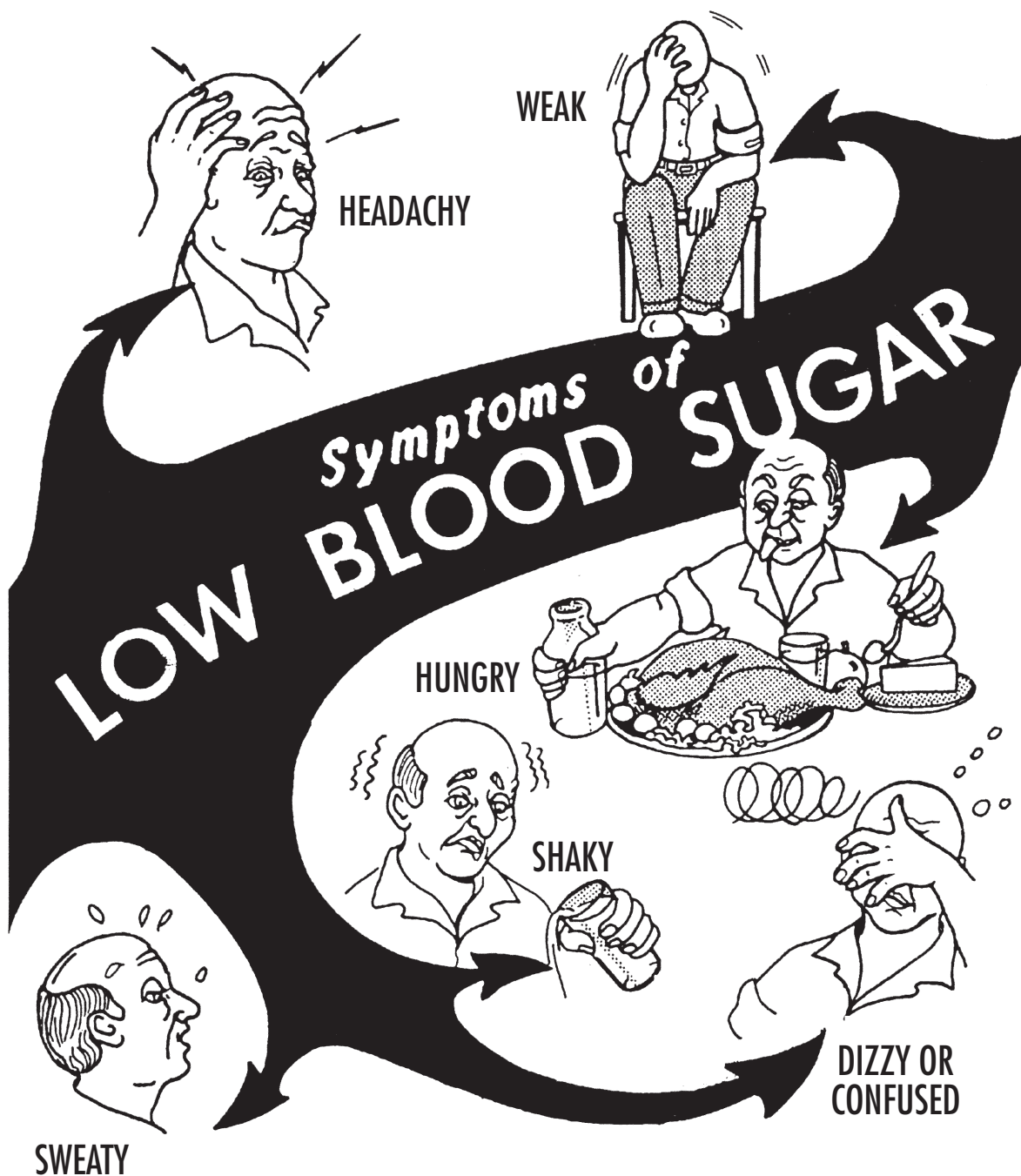
It usually takes 15 minutes to work. A family member or friend can be instructed on how to give you glucagon if you are unable to take sugar by mouth.

Identification:

Because the symptoms of insulin reaction can appear suddenly, any time and any place, it is wise for the person with diabetes to carry a medic alert card - a card for the wallet, and a medic-alert bracelet or necklace.



INSULIN REACTION



Diabetic Coma

Definition:

A state of unconsciousness brought about as the result of extremely high blood sugar. Occurs most frequently in people with diabetes who require insulin (type 1). Usually takes one to three days for the symptoms to appear. The first sign may be a large amount of sugar and acetone (ketones) in the urine.

Causes:

- *Undiagnosed* or untreated diabetes
- *Overeating* or “binge” eating
- *Failure to take diabetes* medication properly - omitting your insulin
- *Infections* - cold, urinary tract, sores that do not heal, etc.
- *Stress* - death of a family member, loss of job, heart attack, automobile accident, etc.

Symptoms:

- Excessive thirst
- Frequent urination
- Dry skin
- Poor appetite
- Weight loss
- Nausea and vomiting
- Tiredness/drowsiness
- Visual changes
- Itching of the skin
- Difficulty breathing
- Pain in the stomach
- Fruity odor on breath
- Boils and infections
- Slow healing

Signs:

- Blood sugar level will be high as a result of one of the causes mentioned above.
- Acetone or ketones may or may not be present in the urine depending on the type of coma. As you remember, acetone results from the breakdown of stored fat in the body.

Treatment:

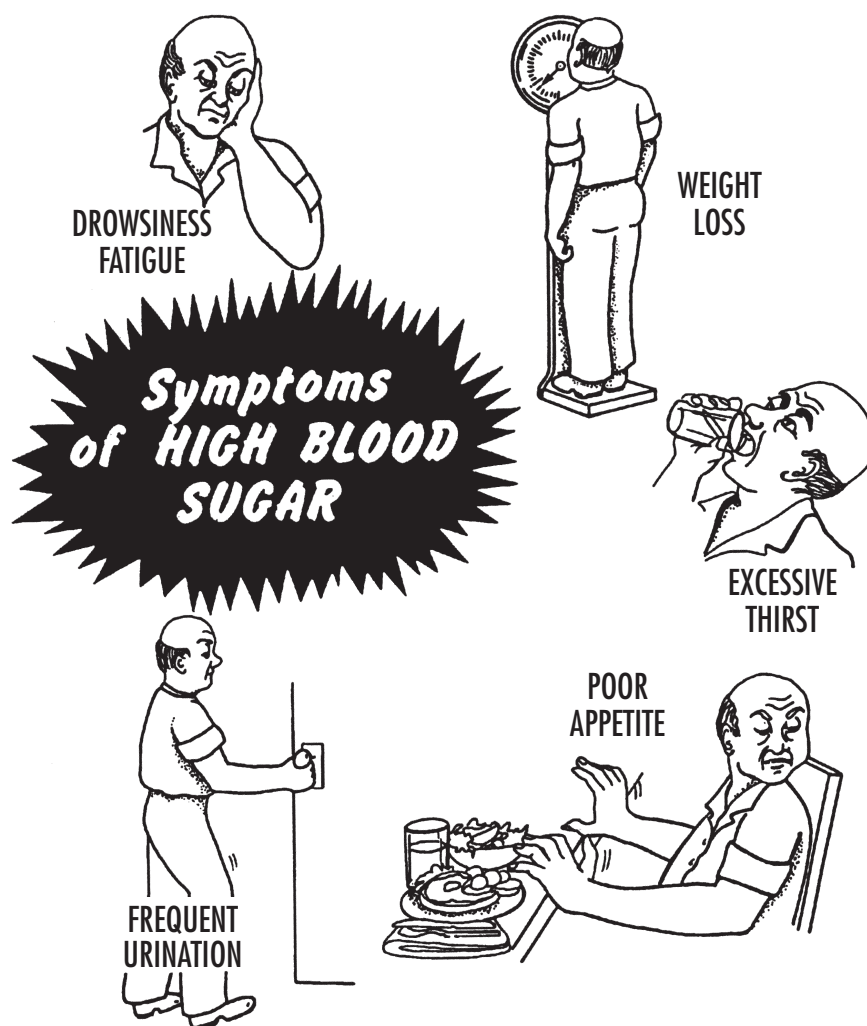
- Intravenous fluids (fluid given through your veins) to correct dehydration
- Insulin is given to lower to blood sugar
- Rest



Prevention:

- Test blood glucose regularly - 4 times per day when ill.
- Test urine for ketones when blood sugar is 240 or above. *Call the doctor* for persistent high glucose or the presence of ketones in the urine.
- When a known infection is present, report it to your physician.
- Call the doctor when high blood sugar symptoms occur - excessive thirst and frequent urination.
- Do not drink alcoholic beverages to excess or eat large quantities of carbohydrate foods. Stay within your dietary allowance.

DIABETIC COMA



Chronic Complications

General Considerations

Prior to the discovery of insulin in 1921 by Dr. Banting and Dr. Best, diabetes could not be controlled and many people with diabetes died of diabetic coma. Insulin and the more recently discovered oral drugs have made it possible to control diabetes so that people with diabetes can now lead longer, more productive lives. However, some people with diabetes still develop complications that seem to be related, at least in part, to the length of the disease and to poor control of the blood sugar. Therefore, careful attention must be paid to dietary management, weight control and medications in an effort to delay or hopefully prevent the onset of these complications.

In two major studies of people with type 1 or type 2 diabetes, doctors found that those who kept their blood sugar near normal over a period of time felt better and had less trouble with their heart, eyes, feet, and kidneys. This research proved that the closer you keep your blood sugar to normal (80-120 mg/dl), the better your chances are of avoiding trouble with your eyes (blindness), heart, kidneys (kidney failure), and feet (amputations).

...careful attention must be paid to dietary management, weight control and medications...

Large Blood Vessel Disease

Large blood vessel disease is a process that results in partial obstruction of larger arteries in the body by a deposit of fatty substances and calcium on the inner wall of the artery. *Arteriosclerosis* (hardening of the arteries) is an example of this. This condition occurs normally as a part of the aging process. However, it seems to occur at an earlier age in people with diabetes.

Arteriosclerosis contributes to poor circulation. Some of the major signs and symptoms of decreased blood flow could be slowed healing, pain in the leg muscles, coldness of the feet, and poor skin health in general. Gangrene and amputation may sometimes result from severe arteriosclerosis. The need for amputation can be significantly reduced by taking good care of the feet.



Small Blood Vessel Disease

Small blood vessel disease affects four major areas of the body: heart, eyes, kidneys, and feet.

Heart

Heart disease and high blood sugar commonly seen in older people may develop earlier in an individual with diabetes. This is because people with diabetes are at risk for a higher incidence of arteriosclerosis (hardening of the arteries) that contributes to the problem of poor circulation.

Eyes

Our eyes function very similarly to a camera, with a lens focusing light on the retina or film. The retina contains many small blood vessels and vision may be affected if these vessels become diseased. The result may be hemorrhaging and fatty deposits in front of the retina. This disease condition is referred to as retinopathy (retino refers to retina, opathy refers to disease of). Retinopathy usually occurs slowly and generally produces no pain. It is frequently associated with uncontrolled or undiagnosed diabetes.

There are several treatments for moderate to severe retinopathy but the most commonly used method is called *photocoagulation*. This process is painless and employs the use of a laser beam (instrument that converts light energy to heat energy) which “seals off” the bleeding areas in the eye.

Other problems affecting the eyes include:

Blurred vision - A temporary problem that often comes and goes with fluctuation in blood sugar. One should never be fitted with glasses during this time. It would be best to wait until the blood sugar is well controlled. This usually takes six to eight weeks after control is first achieved.

Cataract formation - a clouding or film over the lens of the eye. Diabetic cataracts occur most frequently with type 1 diabetes. They can be treated surgically.

Kidneys

Small vessel disease that affects the kidneys is more prevalent in people who have had diabetes for many years. This condition may lead to impaired kidney function. This complication is referred to as diabetic nephropathy (opathy - disease of/nephro- the nephrons which are the tiny functioning units of the kidney).

Foot Disorders and Gangrene

As the result of arteriosclerosis, people with diabetes are also prone to problems of poor circulation and infection. Since the heart is the body's pump, it is responsible for circulating blood to all parts of the body. Because the feet are the part of the body farthest away from the heart, they will be affected most by poor circulation. Any injury to the feet, when poor circulation exists, may result in the development of infection and/or gangrene. Gangrene may be treated medically with bed rest and antibiotics. Surgical treatment is only necessary if the infection becomes widespread or affects the underlying bone structure of the foot and medical management has no longer proven to be effective.

Diabetic Neuropathy (Disease of the Nerves)

This is a condition usually seen in people who have had diabetes for a long time. It results in loss of nerve function. The symptoms associated with neuropathy may be related to poor diabetic control. There are many forms of neuropathy that are generally classified into two categories:

Peripheral Neuropathy (Feet/hands)

Symptoms:

- Numbness in feet or hands
- Burning or aching pains
- Pins and needles sensation
- Weakness in arms or legs
- Ulcer formation of feet/legs

Autonomic Neuropathy (Internal organs)

Symptoms:

- Diarrhea or constipation
- Dizziness when standing
- Loss of ability to control urine
- Sweating, especially at night
- Loss of sexual function (impotence, erectile dysfunction)

There is no specific treatment for neuropathy, however good control of the blood sugar may help improve symptoms. In addition, good foot care is an important factor in the management of neuropathy.



Social Aspects

Employment

Many people who have recently been diagnosed with diabetes ask, “How will having diabetes affect my job or employment possibilities?” Realistically, there may be certain restrictions necessary but they will depend upon the type of job and the type of diabetes you have.

Individuals with diabetes may be generally divided into three categories:

1. Those on diet control only.
2. Those on diet and oral agents.
3. Those on diet and insulin.

Jobs may be classified into two types: hazardous or non-hazardous. Individuals in the first two categories will usually have no employment restrictions and may be allowed to perform both hazardous and non-hazardous duties. People on insulin, however may have insulin reactions (hypoglycemia) that might endanger himself/herself others around him/her. Therefore, they should not be assigned hazardous jobs such as driving large commercial vehicles or working with heavy equipment. The employer may consider reassignment to a less hazardous job.

The person with diabetes should make every effort to assure his/her employer that he/she is under adequate medical supervision. The dates of his/her doctor visits should be recorded in the individual's medical file. The employer should be informed that the blood sugar is under control or that all efforts are being made to achieve adequate control. Good control is defined as a fasting plasma glucose

of 80-120 mg and two to four hours after eating of 150 mg or below and no symptoms of either high or low blood sugar.

The American Diabetes Association (ADA) is supportive of continued employment of individuals with diabetes and has established a committee on employment and insurance which issued a statement in 1984 confirming this support:

Any person with diabetes, whether insulin dependent or non-insulin dependent, should be eligible for any employment for which he/she is otherwise qualified.

This statement is important because it calls for the individual decision about employment and job responsibilities. It does not state that all people with diabetes should be eligible for all jobs but rather that each person's qualifications should be evaluated individually, taking into account the nature of the job and the person's ability to perform it safely and effectively.

Federal and state laws exist which both facilitate and often prohibit the person with diabetes from seeking employment. Title V of the Federal Rehabilitation Act of 1973 (Sections 501, 503 and 504) indicates that diabetes is legally a “handicap” and cannot be used to discriminate or exclude qualified workers from jobs, promotions or other employment activities. Under the newer Rehabilitation Act of 1991 - The American with Disabilities Act - the provisions of the previous act were expanded to add diabetes as a defined disability.



Title V also indicates that the employer must make “reasonable accommodations” for the person’s condition. In addition, state anti-discrimination laws often exist to protect individuals with diabetes. These laws vary from state to state. Among the state offices that should be able to give you information about your state laws are the Labor Department, Human Rights Offices, and the Governor’s Office.

Just as there are laws that will benefit you, there are laws that work against you. For example, the Federal Aviation Administration regulations deny airline pilots’ licenses to persons who have diabetes and take insulin or oral medications. In addition, federal regulations prohibit people with diabetes that require insulin from entering or staying in the armed services. Also, the Department of Transportation prohibits persons with insulin-dependent diabetes from hauling goods in interstate commerce.



Insurance

People with diabetes express considerable concern over whether or not they are eligible for life and health insurance. Most life insurance companies issue policies to them but usually at an increased cost. Your doctor will be requested to complete a questionnaire for the company to which you have applied for insurance. His/her answers to the questions often will determine whether or not you receive insurance coverage.

Essentially, the insurance company will consider your degree of diabetes control when assessing you as a risk for insurance. You should “shop around” or contact a diligent insurance broker to help you get the best insurance coverage possible at the most reasonable cost. You should also know that some policies are issued with a rider clause that indicates a “pre-existing condition.” This means that there will be no coverage for that condition or any hospitalization that results from that condition. Coverage for all other medical problems would be in effect.

There is also a provision that provides for extra health insurance coverage for persons who, because of a particular illness such as diabetes, may require longer hospitalization when they are admitted for some medical problem other than their diabetes - you are admitted for gall-bladder surgery and you do not heal quickly - requiring longer hospitalization. You will then be covered under this provision.



Appendix

Glossary of Terms

Acetone - a ketone that is formed as a result of the breakdown of body fat - can accumulate in blood and urine - may be detected by a urine test.

Acidosis - an imbalance of body chemistry - an accumulation of acids in the blood - often results in coma.

Amputation - a surgical procedure that results in the removal of a portion of the body, such as a toe, foot or leg.

Aspartame - a safe sugar substitute that is about 200 times sweeter than sugar.

Blood glucose, blood sugar, plasma glucose - all used interchangeably to describe amount of sugar in bloodstream (normal - 60-110mg/dl).

Brittle diabetes - a type of diabetes that is very difficult to control/regulate. Blood sugars fluctuate widely. Otherwise known as type 1 diabetes.

Calorie - a measure of the energy the body uses for action.

Carbohydrate - the scientific name for sugars and starches. It is the major source of energy for the body and the food source most likely to raise the level of blood glucose.

Cholesterol - a fat-like pearly substance found in all animal fat and oil, blood, brain tissue, milk, yolk of eggs, etc. Normal range in the blood is 120-200 mg/dl.

Dermopathy - disease related to the skin.

Diabetes mellitus - a chronic, often hereditary disease in which there is an alteration in the metabolism of carbohydrates, protein and fats due to an insufficient production or action of insulin.

Diabetic coma - a state of unconsciousness brought about as the result of high blood sugar, dehydration and the accumulation of acids in the blood.

Diagnosis - to recognize the nature of a disease and to distinguish one disease from another.

FPG or FBS - fasting blood sugar or plasma glucose taken in the morning prior to breakfast and before anti-diabetic medication (pill or insulin) is given.



Food exchange - a system in which foods are organized into 6 food groups to allow for a variety of selection to provide a well balanced diet.

Gangrene - a darkened discoloration of the skin which usually develops as the result of poor circulation, injury and bacterial infection - most frequently occurs in the extremities - hands or feet.

Glucose - the simplest form of sugar that is used by the body for energy.

Glucagon - a hormone produced by the pancreas that brings about the release of glucose from its storage place in the liver. Can be purchased commercially for use during severe insulin reactions.

HbA1c - a single blood test, not affected by eating, which will provide a summary of blood glucose levels over a six to eight week period of time. Used to monitor diabetic control.

Hyperglycemia - high plasma glucose - greater than 140 mg/dl.

Hypoglycemia - low plasma glucose. Lower than 60 mg/dl.

Insulin - a hormone produced by the beta cell of the pancreas, the effects of which lower the blood sugar. Commercial insulin is produced biosynthetically using recombinant DNA to make human insulin.

Insulin reaction - a situation in which the blood sugar falls below normal and brings about symptoms of weakness, sweating, nervousness and hunger.

Insulin receptor - a complex protein that is located on the surface of the target (body) cell which serves to recognize and carry out the action of insulin within the cell that is the storage or utilization of insulin.

Insulin resistance - indicates that a higher than normal level of insulin is required to produce a lowering of the blood sugar.

Ketone - a fatty acid that can be demonstrated in the blood and urine when fat breakdown occurs in the body.

Nephropathy - kidney failure frequently associated with diabetes of long standing.

Neuropathy - loss of nerve function in various parts of the body.

Nutrasweet - a brand name of aspartame - a safe sugar substitute (also known as Equal).

Obese - excessively overweight (fat). **Obesity** - an increase in body fat above the recommended normal level for body frames.



O.G.T.T. - Oral glucose tolerance test is a series of blood and urine sugar tests that are taken in a three to five hour period of time. This test helps to confirm a diagnosis of diabetes.

Pancreas - a 3 ounce gland located in the abdomen behind the stomach which functions to secrete hormones, including insulin and glucagon.

Pathophysiology - disorder or abnormal function of the body.

Plasma glucose - used interchangeably with blood sugar or blood glucose.

Post prandial - blood sugar taken one to two hours after a meal.

Recombinant DNA - genetic material that makes up genes which is a code to produce things that are identical or very different.

Renal - refers to kidneys.

Retina - inner lining of the eye - compares to the film of a camera.

Retinopathy - an eye condition frequently seen in individuals with diabetes characterized by the hemorrhaging of blood vessels in the retina of the eye.

Triglycerides - fats made by the body as a result of consuming increased carbohydrates (sugars) or alcohol. Normal range in the blood is 0- 150 mg/dl.

Viruses - infectious particles smaller than bacteria that frequently are associated with causing disease in animals and man.

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Height and Weight Table
Desirable Weights for Men and Women
According to Height and Frame, Ages 25 and Over*

Men					Women					
Height (In Shoes, 1-Inch Heels)			Weight in Pounds (In Indoor Clothing)			Height (In Shoes, 2-Inch Heels)		Weight in Pounds (In Indoor Clothing)		
Feet	Inches	Small Frame	Medium Frame	Large Frame	Feet	Inches	Small Frame	Medium Frame	Large Frame	
5	2	128-134	131-141	138-150	4	10	102-111	109-121	118-131	
5	3	130-136	133-143	140-153	4	11	103-113	111-123	120-134	
5	4	132-138	135-145	142-156	5	0	104-115	113-126	122-137	
5	5	134-140	137-148	144-160	5	1	106-118	115-129	125-140	
5	6	136-142	139-151	146-164	5	2	108-121	118-132	128-143	
5	7	138-145	142-154	149-168	5	3	111-124	121-135	131-147	
5	8	140-148	145-157	152-172	5	4	114-127	124-138	134-151	
5	9	142-151	148-160	155-176	5	5	117-130	127-141	137-155	
5	10	144-154	151-163	158-180	5	6	120-133	130-144	140-159	
5	11	146-157	154-166	161-184	5	7	123-136	133-147	143-163	
6	0	149-160	157-170	164-188	5	8	126-139	136-150	146-167	
6	1	152-164	160-174	168-192	5	9	129-142	139-153	149-170	
6	2	155-168	164-178	172-197	5	10	132-145	142-146	152-173	
6	3	158-172	167-182	176-202	5	11	135-148	145-159	155-176	
6	4	162-176	171-187	181-207	6	0	138-151	148-162	158-179	

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*Available from the American Diabetes Association by calling: 1-800-232-6733 or order online: store.diabetes.org

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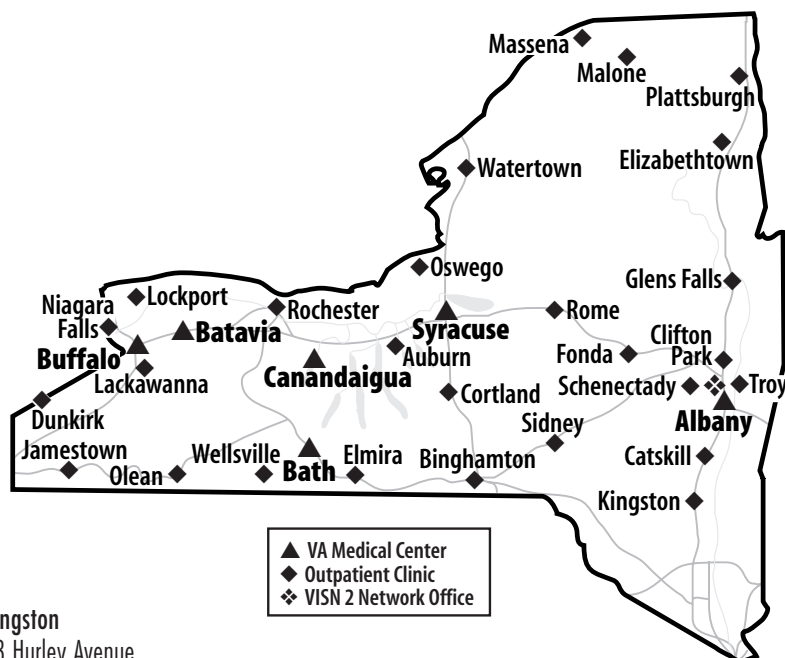
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